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The Outlook

Battleships to Carriers

SOMEWHAT belatedly, it might seem, memorial busts of two famous admirals, Lord Jellicoe and Lord Beatty, were unveiled at an impressive ceremony in Trafalgar Square on October 21st, Trafalgar Day. The fame of these two sailors dates back to the First World War, and it appears just a little strange that a period of thirty years should have been allowed to elapse before an honour of such permanent character was bestowed upon them. Not only so, but in the meantime we have had a not inconsiderable Second World War, in which the Navy again served the country well.

It will not have escaped the notice of the more observing that the unveiling ceremony was performed by a soldier, His Royal Highness the Duke of Gloucester. Indeed, he himself referred to the fact. Apart from his admirable personal qualities, which all admit, he is a Royal Prince and a soldier. The latter qualification made him a "neutral," as it were, now that the Royal Navy has ceased to be our first line of defence, and that function has been taken over by the Royal Air Force.

His Royal Highness most appropriately recalled that it was said of Lord Jellicoe in the First World War that he was the only man on either side who could have lost the war in an afternoon. That was almost literally true. If he had lost the war at sea, we should have been in a sorry plight. Germany's navy could have suffered a defeat without thereby necessarily losing the war. Germany would still have her army. Jellicoe did not lose the First World War, and the honour shown him and Beatty last week is thoroughly merited.

Things have changed immeasurably since 1918. Not only is it inconceivable that any one man can again be called upon to shoulder responsibilities such as those assumed by Admirals Jellicoe and Beatty, but no single Service can in future be expected to act so independently. What the Second World War showed very clearly was that the three Services are interdependent to an astonishing degree. And that interdependence is likely to increase rather than the reverse. And so the Royal Navy was quite logical in honouring in this way the memory of what may well be the last two of its Admirals to serve the nation so outstandingly purely as sailors. There will be other admirals of great merit. No one doubts that. There already are great admirals, as World War II proved. But Jellicoe and Beatty represented the end of the old Navy. The new Navy has lost to the Royal Air Force its function as our first line of defence, and is itself already "taking to the air" in a big way. That is not to say that its importance is negligible. Far from it. But it does mean that the emphasis has shifted, to put it briefly, from battleships to carriers.

High-tension Cables Again

ONCE more the aviation world mourns the loss of valuable lives in an air accident. It is not only the size of the catastrophe which appals (not one of the 40 occupants of the Constellation survived) but the fact that judging by present accounts, it looks as if the mishap need not have occurred.

There are many cases on record in which the conclusion reached after investigation was that the pilot was guilty of an error of judgment. In fact, many think the pilot has too often been blamed on insufficient evidence. In this case the pilot, Mr. Parmentier, was quite exceptionally experienced, and was in fact Chief of Flying Services of the K.L.M., an air line with the very highest reputation. Thus there is every reason for not rushing to the conclusion that the pilot was at fault, although even the most experienced can make a mistake, or be the victim of a moment's forgetfulness, as was shown in the case of another veteran K.L.M. pilot, Mr. Geyssendorffer, who took off with his elevator locked.

According to present accounts, it appears that the Con-

stellation was brought into Prestwick on a G.C.A. let-down, and that it broke cloud over the airport. Parmentier, it is reported, informed Control that he would overshoot and do a visual circuit before landing.

It is, of course, possible that Parmentier's judgment may have been at fault in coming to this decision, but to us it appears unlikely. Of his skill as a pilot there cannot be any doubt. Perhaps in this connection we may be permitted to quote an instance from personal experience. As long ago as 1934, the Editor of this journal was invited to take part in a circuit of Holland in order to experience the comfort of the DC-2 which Parmentier was shortly to fly in the England-Australia Race with Mr. Moll as co-pilot. Some of the Dutch grass airfields were none too large for the Douglas, and on every occasion Parmentier put the machine down at the very edge so as to get the longest possible landing run. At one place, the tail had only just cleared the canal which bordered the airfield when the wheels touched-down to a perfect three-pointer. The example is quoted to show Parmentier's perfect judgment of speed and distance.

That flight was, of course, made in daylight, and the approaches were on the whole a good deal easier than those at Prestwick, but Parmentier had in the meantime added largely to his experience, and had accumulated thousands of hours in many parts of the world. He must have weighed-up the circumstances and come to the conclusion that in the prevailing conditions a visual circuit was preferable to making another G.C.A. let-down. It is conceivable that this decision is open to challenge. It may be that as a pilot of such long experience Parmentier did not feel too confident in outside aids, having trusted to his own visual judgment for so many years. Not a few of the older pilots have that feeling. But even so, there is every reason to believe that the visual circuit would have been quite normal but for the fact of striking the high-tension cables, which the pilot obviously could not see, although he probably knew fairly accurately his location in relation to the ground.

Flight has more than once agitated for the burial under ground of these cables. The reply has always been that this is costly, and that there is leakage of electricity. Such excuses may apply to the grid generally, but they are totally inadequate in a case where the cables are sufficiently close to an airport to constitute a danger to circuiting aircraft. At Prestwick there are already hazards imposed by nature in the form of hills. The man-made risk must be removed, not only from the Prestwick area but from the vicinity of any other airport.

CONTENTS

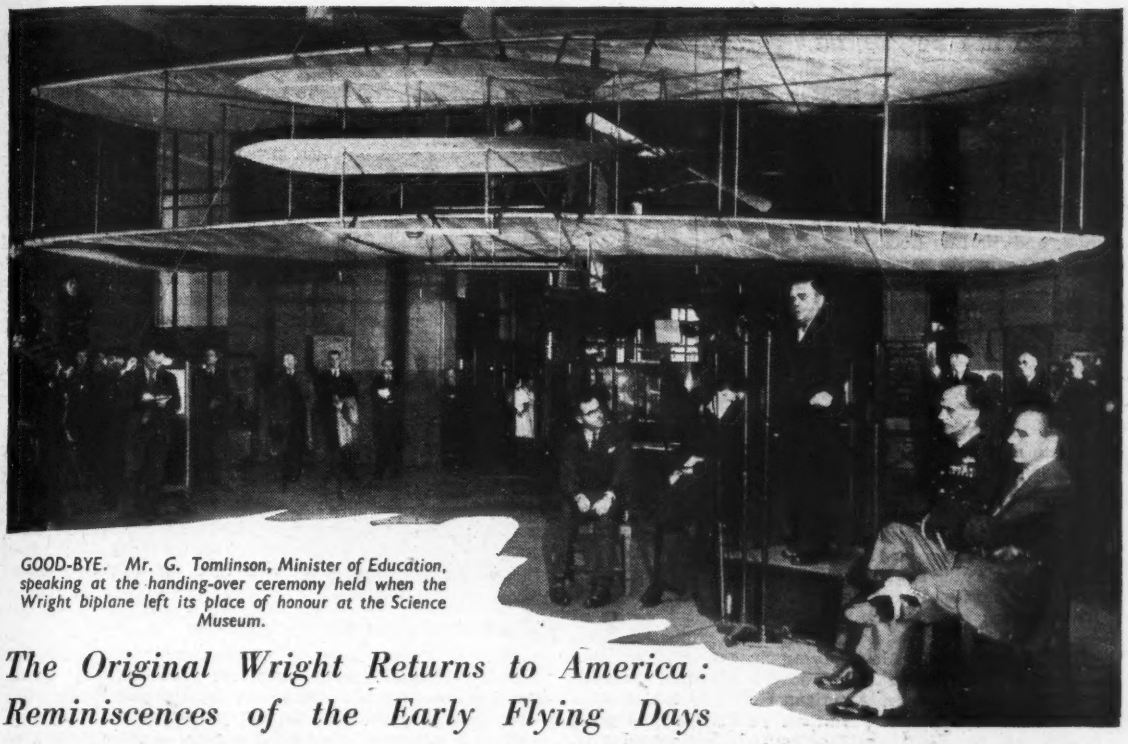
Outlook	503
Back to the Beginning	505
Here and There	508
Anglo-American Civil Air Relations	510
Fokker To-day	511
Rocket Cameras Record Earth's Surface from 57 Miles Up	516
Photographic Phenomenon	518
Civil Aviation News	519
Cold Weather Operation of Aircraft	523
Ground-attack Vampires	526
Correspondence	527
Service Aviation	528

Forthcoming Events page 527

28th Meeting of the Gas Turbine Collaboration Committee

For the fourth time since the Committee was formed, largely as a result of the inspiration of Dr. Roxbee Cox, de Havillands were the hosts at Hatfield on October 19th and 20th. Much work was completed on the first day, and on the second, the members saw development work now going on, including some which has resulted in more thrust than is available in present R.A.F. equipment. Dr. Roxbee Cox was unable to be present, and is therefore missing from this group.

Left to right. (*Front row*): Capt. Luby, D.E.R.D., M.O.S.; J. E. Cutts, Bristol Aeroplane Co.; Dr. O. A. Saunders, Imperial College; W. A. Rendalls, B.T.H.; H. Constant, N.G.T.E.; J. Rosen, Admiralty; Air Marshal Sir Alec Coryton, C.S.(A), M.O.S.; F. A. Foord, D/D.E.R.D. M.O.S.; J. P. Herriot, Rolls-Royce Ltd.; S. Scott-Hall, P.D.T.D.(A); W. G. A. Perring, R.A.E.; A. Cdre. Sir Frank Whittle, Adv.C.S.(A). *Left to right.* (*Back row*); Dr. J. S. Clarke, Joseph Lucas; E. Danvers, Rotol; E. M. Butcher, N.G.T.E. (Secretary); W. F. Saxton, Armstrong Siddeley Motors; E. Glaister, Imperial College; S. W. Mansell, Bristol Aeroplane Co.; A. A. Lombard, Rolls-Royce; A. R. Howells, N.G.T.E.; H. Pearson, Rolls-Royce; W. H. Arscott, de Havilland; Cdr. Tracy, Admiralty; W. H. Lindsey, Armstrong Siddeley Motors; D. L. Brown, AD.Eng.R.D.2., M.O.S.; Cdr. C. M. Hall, NA/D.E.R.D.; T. G. Newbury (partly covered by Dr. Shannon), Eng.R.D.4.; Dr. Shannon, Metropolitan-Vickers; W/C. Lees, N.G.T.E.; Dr. D. M. Smith, Metropolitan-Vickers; B. W. Millington, Ricardo; E. S. Moult, de Havilland; C. H. Griffiths, A.D.Eng.R.D.4.; O. Lawrence, Joseph Lucas.; Dr. J. W. Drinkwater, AD.Eng.R., M.O.S.; L. G. Fairhurst, Rotol; R. H. Schlotel, AD.Eng.R.D.1, M.O.S.



GOOD-BYE. Mr. G. Tomlinson, Minister of Education, speaking at the handing-over ceremony held when the Wright biplane left its place of honour at the Science Museum.

The Original Wright Returns to America: Reminiscences of the Early Flying Days

BACK to the BEGINNING

IN these days of sonic speeds it is salutary to reflect that the very first power-driven flight in which man ascended into the air in a heavier-than-air machine, flew it under control, and landed it safely again, was made less than half a century ago. The date was December 17th, 1903, the place Kitty Hawk, North Carolina, the machine the Wright biplane, and the man Orville Wright.

Several years elapsed before the world in general received convincing proof that Wilbur and Orville Wright really *could* fly, and when it was finally established beyond doubt that Orville Wright had made the first controlled flight, his compatriots for a time denied the brothers the honour which was their due. Attempts were made to prove that the Langley "Aerodrome," as it was called (a very flimsy contraption with its wings in tandem), could have flown, and when both the Langley and Wright machines were exhibited in the Smithsonian Institution, Washington, D.C., the placard on the Langley machine bore wording which was not in accordance with facts.

In the meantime, Wilbur Wright had died, and it was left for Orville to carry on the fight for recognition. Patent litigations and the treatment given the brothers by the Smithsonian embittered him to such an extent that he ordered his machine to be removed from that institution and sent to England, where, thanks to the efforts of Mr. Griffith Brewer, the validity of the claims of the brothers Wright was recognized. The first aeroplane to fly properly was given the place of honour in the Science Museum, South Kensington, London. That was in 1928, and, except for the war period, when it was removed for safe keeping, the original Wright biplane remained at South Kensington until October 18th, when it was lowered and crated ready for its return to America in November.

The return of the Wright biplane to the land of its birth was in accordance with the wishes of the late Orville Wright, expressed in 1943. By that time a new secretary, Dr. Charles G. Abbott, had taken over at the Smithsonian; he examined the histories of the Wright and Langley machines, and, as a result, had the offending placard removed from the Langley. Not only so, but he publicly acknowledged the injustice previously done to the Wrights.

It was, therefore, natural that Orville Wright should wish to have the machine returned to the Smithsonian Institution. The handing-over ceremony, which at one time threatened to have precious little to do with aviation, was finally made the occasion for a gathering of representatives of the British aviation world. This was due to the efforts of the Royal Aeronautical Society, and more specifically to its secretary, Captain Pritchard, and his assistant, Miss Bar-

Mr. L. Satterthwaite, American Civil Air Attaché, examines the Wright engine after officially receiving the machine for return to Washington.

Back to the Beginning . . . . .

wood, who sent out invitations at short notice. Otherwise a unique occasion to honour the memory of the Wright brothers would have been missed.

In the event, the Royal Aeronautical Society was represented by its president, Dr. Roxbee Cox, and the Royal Aero Club by the secretary-general, Col. Preston. The Air Ministry and the Royal Air Force were also represented, and Sir Ben Lockspeiser represented research. In a private capacity several pioneers of British aviation attended. They included Sir Alliott Verdon-Roe, who was one of our earliest experimenters, and who, by designing the 504 in 1913, laid the sound foundations of the now-famous Avro firm; Sir Francis McClean, to whose generosity the establishment of Short Brothers as the first British aircraft constructors was largely due, and who made it possible for the Wright biplanes to be built in this country; it was unfortunate that Mr. Oswald Short was unable to make the journey from his Cornwall home. Sir John Buchanan, a vice-president of the Royal Aeronautical Society and for many years Director of Technical Development in the Air Ministry and Ministry of Aircraft Production. Mr. W. O. Manning, who began to design aircraft in 1909 or so. Dr. A. P. Thurston, who worked with Sir Hiram Maxim at the beginning of this century. It was good to see these old-timers at the ceremony.

The handing-over speech was made by the Minister of Education, Mr. George Tomlinson, who emphasized the remarkable progress made in flying since that memorable day in 1903. The Wright biplane was accepted officially by Mr. L. Satterthwaite, American Civil Air Attaché, on behalf of his Government. He thanked Britain for having guarded this historic aircraft so well during a period of twenty years. Here it is not inappropriate to remind readers that Mr. Satterthwaite has paid England a nice compliment by using a Spitfire as his personal aircraft.

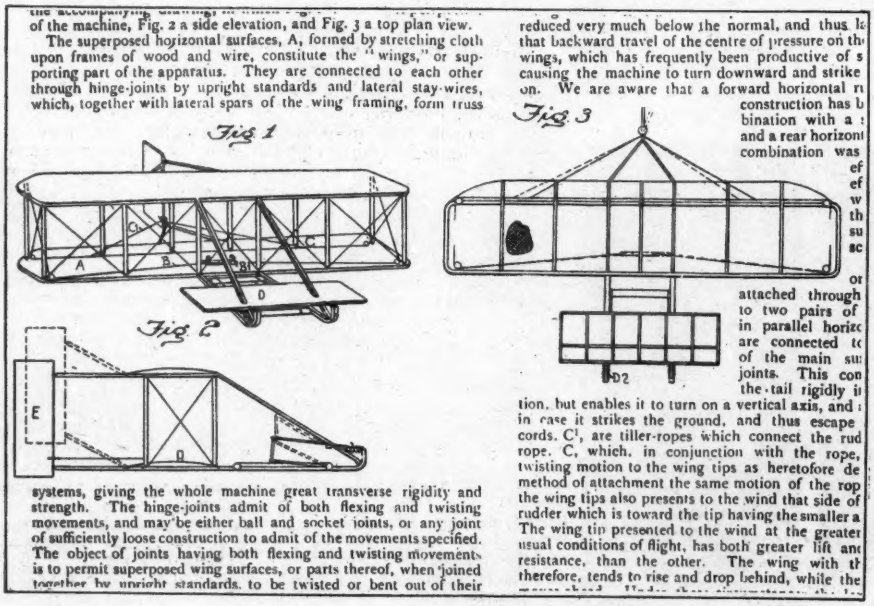
Now that the Wright machine can no longer be inspected, a few reminiscences of the early flying days may be of interest. When Wilbur and Orville Wright first began to experiment, they soon discovered that the data on aerodynamics published up till that time were quite unreliable and misleading. They decided to find out for themselves, and designed and built a small wind tunnel in which they tested hundreds of model aerofoils in order to determine the best shape. They examined the problems of airscrews, and came to the conclusion that low revolutions gave the greatest efficiency. They therefore employed chain gearing between engine and propellers; not only so, but they crossed one of the chains so that the two propellers revolved in opposite directions. They experimented with gliders built on the basis provided by their researches. They realized that warping the wings (wing-warping was used by them instead of the ailerons favoured by some French experimenters) caused the machine to yaw, and so they connected the rudder control to the lateral control. What was, perhaps, as remarkable as anything they did, the Wright brothers designed and built their own engine, a four-cylinder water-cooled. It gave about 12 h.p., but was deemed sufficient for flight, once the machine was in the air. For the take-off, use was made of a dropping weight in a low tower, and a starting rail. Thus the Wrights also became the first to apply assisted take-off successfully.

The one thing which, surprisingly enough, the brothers do not appear to have fully realized was the need, for stability in a fore-and-aft direction, of having the centre of gravity ahead of the centre of pressure, balancing the machine with a front elevator set at a greater angle than that of the mainplanes. Their front elevator was small and insufficiently loaded, so that elevator control was tricky. This oversight appears the more remarkable when one realizes that the brothers discovered in their wind tunnel that cambered aerofoils have an unstable centre of pressure movement.

The First Power-driven Machine

In the first machine, in which Orville made the first flight on December 17th, 1903, the pilot lay prone on the lower wing, and the engine lay on its side beside him. They had fully realized the importance of reducing drag, and in a statement made to the Aero Club of New York in 1906, there occurred a sentence which is as true to-day: "The best dividends on the labour invested have invariably come from seeking more knowledge rather than more power." The front elevator in this first machine was operated by the pilot's left hand, and the wing-warping and its interconnected rudder control was by moving the body from side to side. This arrangement was abandoned in later machines, and both the pilot and the engine, as well as the passenger, sat upright, a comfort which was doubtlessly paid for in extra drag. There were, on the later types, two upright control sticks, of which the left operated the elevator while the right warped the wings. The rudder was controlled by a short handle pivoted on the top end of the wing-warping stick.

The original British patent specification gives a clear indication of how thoroughly the Wright brothers understood their problems. One of the pictures published herewith is a reproduction of a page in the April 25th, 1908, issue of *The Automotor Journal*. This journal carried for many years a section devoted to flying until, in 1909, Mr. Stanley Spooner, its proprietor and editor, decided to launch *Flight* as a separate journal.



of the machine, Fig. 2 a side elevation, and Fig. 3 a top plan view.

The superposed horizontal surfaces, A, formed by stretching cloth upon frames of wood and wire, constitute the "wings," or supporting part of the apparatus. They are connected to each other through hinge-joints by upright standards and lateral stay-wires, which, together with lateral spars of the wing framing, form truss

Fig. 1

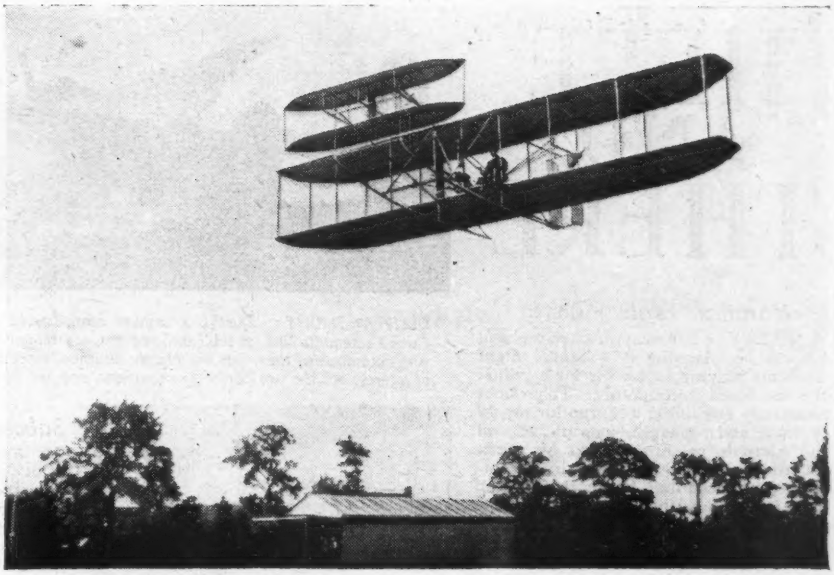
Fig. 2

Fig. 3

systems, giving the whole machine great transverse rigidity and strength. The hinge-joints admit of both flexing and twisting movements, and may be either ball and socket joints, or any joint of sufficiently loose construction to admit of the movements specified. The object of joints having both flexing and twisting movements is to permit superposed wing surfaces, or parts thereof, when joined together by upright standards, to be twisted or bent out of their

reduced very much below the normal, and thus le that backward travel of the centre of pressure on th wings, which has frequently been productive of s causing the machine to turn downward and strike on. We are aware that a forward horizontal r construction has b bination with a and a rear horizon combination was ef ef w th su ac or attached through to two pairs of in parallel horiz are connected t of the main su joints. This con the tail rigidly i tion, but enables it to turn on a vertical axis, and in case it strikes the ground, and thus escape cords. C1, are tiller-ropes which connect the rud rope. C, which, in conjunction with the rope, twisting motion to the wing tips as heretofore de method of attachment the same motion of the rop the wing tips also presents to the wind that side of rudder which is toward the tip having the smaller a The wing tip presented to the wind at the greate usual conditions of flight, has both greater lift an resistance, than the other. The wing with th therefore, tends to rise and drop behind, while the

The original Wright Patent Drawings, as published in "The Automotor Journal" (precursor of "Flight") of April 25th, 1908.



First real proof that the Wright biplane could fly was provided by this photograph of Wilbur Wright flying at Le Mans, France, published in "The Automotor Journal" of August 22nd, 1908.

It was not until Wilbur Wright brought one of his machines to France in 1908 that one really found out anything reliable about the Wright biplane. In France he made flight after flight, each of longer duration than the previous one. In *The Automotor Journal* during September of that year were recorded successive flights of the following durations: 57m 31s; 62m 13s; and 1h 31m 25s.

One of the earliest British sportsmen to visit Wilbur Wright in France was the Hon. C. S. Rolls, and in an article in the October 17th, 1908, issue of *The Automotor Journal*, he recorded his impressions of a flight with Wilbur. He became so enthusiastic that later he bought the first Wright biplane built by Short Brothers. Some time later he lost his life on a modified version in which the elevator broke. By this time the elevator had been moved from in front of the wings back to the tail, but it was a defect in the individual elevator which cost Rolls his life, and thus deprived him of the satisfaction of seeing the Rolls-Royce firm grow to the world-famous position it occupies to-day.

C. S. Rolls was not, however, the first Englishman to make a flight as a passenger with Wilbur Wright. That honour fell, on the same day, to Mr. Griffith Brewer, who later organized the manufacture under licence of the Wright machines by Shorts, and became a close friend of the Wrights. It was Mr. Brewer who did so much to obtain recognition for the Wrights, and it was he who, in 1914, was instrumental in settling on very reasonable terms the rights by which the British Government, and through it the British aircraft industry, had full use of any device or system covered by the original Wright patent. The sum was modest enough in all conscience: £15,000, and it relieved the industry of all fear of possible patent litigation.

The Wright biplane is now returning to America, and both Wilbur and Orville have passed away, as has their great English friend, Griffith Brewer. But their names will always be honoured by British aviation folk.

FAIREY APPOINTMENT

MR. J. A. C. MANSON, B.Sc., F.R.Ae.S., Assoc.H.W.C., Director of Aircraft Production, the Ministry of Supply, since 1943, has obtained the agreement of the Minister of Supply to his resignation in order to take up an appointment with the Fairey Aviation Co., Ltd.

The company announces that he will join their staff on December 1st, 1948, as Personal Assistant to the General Manager at Hayes, Middlesex.

R.Ae.S. BRANCH DINNER

THE Isle of Wight Branch of the Royal Aeronautical Society opened the winter session with a dinner at the Royal York Hotel, Ryde, on October 15th. Among the distinguished guests who attended were Dr. H. Roxbee Cox and Mr. N. E. Rowe, President and Vice-President respectively of the parent Society; Capt. J. Laurence Pritchard, Secretary of the parent Society; and Mr. P. Masefield, Director-General of Long-Term Planning at the M.C.A. Sir Arthur Gouge, President of the Isle of Wight Branch, was in the chair. About 70 members attended this dinner, which was preceded by a short reception. In proposing the toast to the parent Society Mr. W. Browning, a Vice-President of the Branch, briefly reviewed the history of the Society. In reply, Dr. Roxbee Cox stressed the importance of the work the Society was doing and confirmed that a Royal Charter was being sought which would set the seal on the Society's activities over the previous 82 years. After Mr. R. V. Perfect, a Vice-President of the Branch, had proposed a toast to the visitors, the chairman called on Mr. P. Masefield, who spoke of the SR 45 flying boat now under construction at Saunders Roe, Ltd., saying that he believed these aircraft would become the "Queen Elizabeths" of the air, able to compare very favourably with all other aircraft. The chairman concurred with this belief, and concluded the evening by thanking the guests for their attendance. Other distinguished guests who were present were Sir Alliott Verdon-Roe and Capt. E. D. Clarke, M.C., Vice-Presidents of the Branch, and the Hon. H. N. Morgan-Grenville, O.B.E.

SIR JOHN CASS TECHNICAL INSTITUTE'S PROGRAMME

IN the 1948-9 session of the Sir John Cass Technical Institute a course of three lectures is to be held on Thursday evenings at 6.30 p.m., beginning on November 4th. The subject of these lectures is "The Internal Combustion Turbine," and the lecturer will be Mr. W. Tipler, M.A. (Cantab). Each lecture will last about one hour and will be followed by a period for questions. Development, characteristics and applications of various gas turbines will be dealt with, and problems yet to be solved will be discussed. The fee for the course is 5s, and the first lecture will be on the aircraft aspect of the gas turbine. Subsequent lectures will cover the marine and industrial applications and problems of fuel and combustion.

A further course of five lectures on the subject of Lubrication will be held by the Institute, beginning on Thursday, February 3rd, 1949, and subsequent Thursday evenings at 6.30 p.m. This series will include: Theory and General Principles, the speaker being Lt.-Col. S. J. M. Auld, O.B.E., M.C., D.Sc. (Lond.); Production, by C. Hull, M.A. (Cantab.), A.R.I.C., M.Inst.Pet.; The Testing of Lubricating Oils and Greases, by C. S. Windebank, B.Sc. (London.), M.S., A.M.I.Chem.E.; Industrial and Marine Lubrication, by R. S. Teale, M.A. (Cantab.), A.R.I.C., F.Inst.Pet.; and Automotive and Aviation Lubrication, by O. T. Jones, B.Sc. (Eng.) (Birm.), M.I.Mech.E. The fee for this course is 10s, and further details of these and other courses may be obtained from the Principal of the Institute, at Jewry Street, Aldgate, London, E.C.3, to whom applications for enrolment should be made before the opening of the course.

HERE AND THERE

Marathon Flight Planned

A PARTY of American airmen are said to be planning a "stunt" flight involving staying in the air for a period of 1,000 hours continuously. This would necessitate remaining airborne for nearly 42 days, and replenishments of fuel, oil and victuals would have to be taken aboard during flight. Enquiries for insurance are, according to reports from the City, meeting with a lukewarm reception.

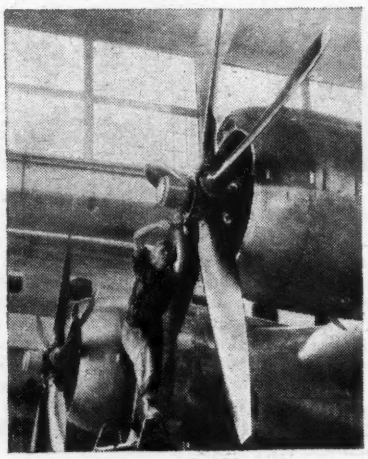
New U.S. Attaché

MR. E. A. LISTER, acting Chief of the American State Department's aviation division, arrived in England on October 22nd to take over the appointment of Civil Air Attaché to Great Britain. He is to succeed Mr. L. Satterthwaite, who is returning to the U.S. to an appointment, not connected with aviation, in the State Department.

P. Masefield at Glosters

TO gain personal experience of flight at speeds around 600 m.p.h. Mr. Peter Masefield, Director-General of Long Term Planning at the Ministry of Civil Aviation, visited the Gloster Aircraft Company on October 13th. At the invitation of the company Mr. Masefield went for a flight in the Meteor 7 Trainer, piloted by S/L. Waterton.

DELIVERY FLIGHT: The TU-2 bomber crash-landed at Linz, Austria, by two Soviet Air Force lieutenants who, at their own request, are remaining in American hands. A sergeant who accompanied them has voluntarily returned, together with the aircraft. Visible points of interest are the two dorsal gun positions, and the pilot's field of view for dive-bombing.



BRISTOL BREDA: Fitting Rotol airscrews to the Breda-Zuppata 308, which is powered by four Bristol Centaurus engines. The 308 has a wing span of 138ft and can carry 48 passengers plus a crew of seven.

Sabotage Suspected in Australia

IN Australia the Acting Administrator of the Northern Territory has officially announced that 60 gallons of water were recently found in a 10,000-gallon bulk installation containing aviation fuel. Sand and leaves were found in a mobile tanker for refuelling air liners at Darwin. Experts are of the opinion that these substances could not have got into the tanker unless deliberately introduced. Detectives are investigating the discovery and samples are being analysed.

Fastest Jet Yet

ACCORDING to Lt. Gen. G. E. Stratemeyer, Chief of the Air Defence Command, U.S.A.F., a rocket-powered research aircraft, the XS-1, has flown at a speed of 1,000 m.p.h. This announcement was made in the course of a speech in Detroit on October 21st.

Pacific Bases

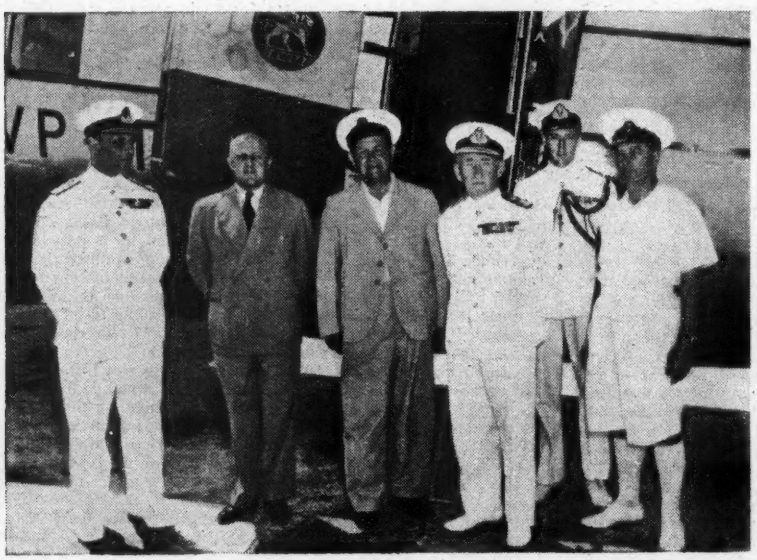
REPORTS from Melbourne state that the Royal Australian Navy and Air Force expect to be operating from the former American base in the Pacific at Manus Island in about six months. The naval operations centre at Lombrum Point is to be re-established as an advance base capable of expansion in an emergency. A permanent air base at Momote is also to be established; engineers are to go to Manus Island shortly to put the base in order.

Scottish Services Protest

NUMEROUS protests have been made from the north of Scotland regarding the proposed withdrawal, due to take effect from November 1st, of the Shetland - Aberdeen - Edinburgh - London air service. This suspension would mean that there would be no air link between the Scottish capital and London, and the only direct flights would be by the twice-weekly Glasgow-London service. In the north, Aberdeen travellers are likely to be most inconvenienced since, there being no service between Aberdeen and Glasgow, they will have to travel by train to Glasgow to pick up the service to London.

Mechanical Handling Papers

AT the recent Mechanical Handling Exhibition and Convention, papers were read by various authorities on many aspects of mechanical handling. A large number of requests have been received for reprints of these papers



FIRST LORD RETURNS: Viscount Hall, First Lord of the Admiralty, photographed before boarding a B.W.I.A. Viking for Jamaica, after visiting the Home Fleet in the West Indies. Left to right: Admiral William-Powlett, Naval Secretary to the First Lord, Lt. Cdr. A. D. S. Murray, general manager, B.W.I.A., Viscount Hall, Admiral Sir R. McGrigor, C-in-C, Home Fleet, Lt. Cdr. McCrum, and Sir J. Lang.

HERE AND THERE

and we now understand that these will be available shortly. All 17 papers are being reprinted separately in brochure form and can be ordered, price 1s each post free, from the Publishing Dept., Dorset House, Stamford Street, S.E.1. A complete list of the papers is available on request from The Editor, Mechanical Handling, at the above address.

Film Stars Fly B.E.A.

AFTER flying from Rome a specially chartered B.E.A. Viking landed at Northolt on October 22nd, bringing Gregory Ratoff, Myrna Loy, Peggy Cummins, Roger Livesey, and Richard Greene back to this country. They had been in Italy shooting scenes for a film of Eric Linklater's *Private Angelo*. Gregory Ratoff, the Russian-American actor-director is a great enthusiast of British aviation and considers that a sense of security is imparted to air travellers by calm and collected courtesy.

Aerial View of Olympics

FOR flying an aircraft in the immediate vicinity of Wembley Stadium during the opening ceremony of the Olympic Games without permission of the M.C.A. or the Olympic Games Committee, Mr. L. Benjamin was, on October 20th, fined £5 and £1 1s costs. Morton Air Service, of Croydon were fined £50 and costs for aiding and abetting Benjamin. Both pleaded guilty. It was stated by the prosecution that during the opening ceremony of the Games, Benjamin circled at low altitude in a DH Rapide for over an hour. Witnesses had estimated the height of the machine as about 350ft, that is 50ft above the height of the stands. During the ceremony 7,000 pigeons were released and it was for this reason as well as the potential danger of flying low over the densely populated areas that permission for aircraft to fly in this vicinity had been withheld.

U.S.A.F. HELICOPTER: Designed and built by the Bell Aircraft Corporation the XH-15 2-seater helicopter shown in this photograph is now undergoing flight testing.

News in Brief

MR. G. N. SNAREY, A.F.C., A.R.Ae.S., has resigned his appointment as Chief Test Pilot of Auster Aircraft Ltd. and has now left the company.

* * *

Inventor of the target indicators used by the Pathfinders during the raids over Germany, Mr. W. F. Coxon, has been awarded £1,500 by the Royal Commission on Awards to Inventors.

* * *

It is announced that the telephone number of Automotive Products Company Ltd., Lockheed Hydraulic Brake Company Ltd. and Borg & Beck Company Ltd. will in future be Leamington Spa 2700.

* * *

Mr. W. Benink, general manager of the Export Department of Mullard Electronic Products, Ltd., left London Airport recently on a sales promotion and investigation tour of the Mullard organization overseas. Accompanied by Mr. R. W. Addie as technical adviser, Mr. Benink will visit Egypt, Siam, India, Pakistan, Ceylon and the Federated Malay States. He will travel by air throughout.

* * *

During recent tests with the McDonnel XF-85 "Parasite" jet fighter, a photograph of which appeared in *Flight*, September 30th, successful reconnection with the parent Superfortress was achieved. After launching from the parent machine the fighter flew for about 20 minutes before rejoining the B-29.

* * *

After 44 years' service with the British Thompson Houston Co., Ltd., Mr. H. A. Price-Hughes, A.M.I.E.E., manager of the publicity department, is to retire at the end of October. He will be succeeded by his deputy, Mr. C. H. Chaplain, and will still be available in a consultative capacity. Mr. Chaplain joined B.T.H. in 1912.

* * *

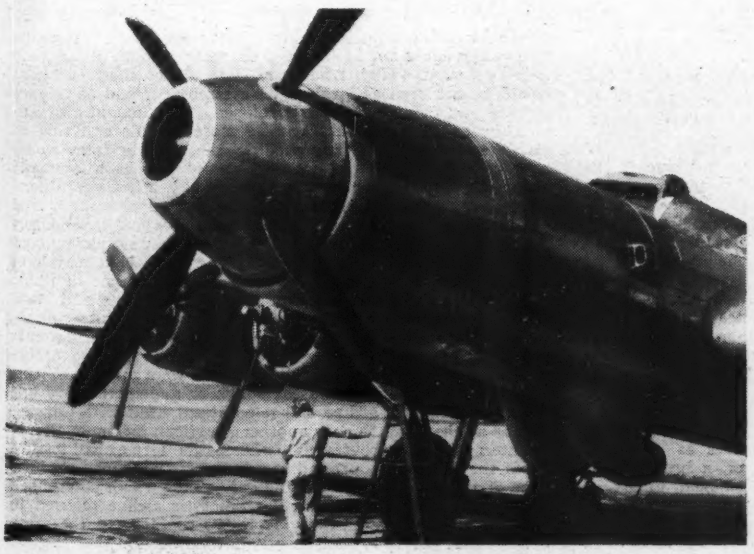
A load of 2 tons of electrical machinery was recently flown 8,000 miles by K.L.M. in response to an urgent call when the electric power station at Bangkok in Siam broke down. The spare parts required were taken on the K.L.M. night freight service from Stockholm to Schiphol and thence by Constellation to Bangkok where they arrived two days after beginning their journey.

* * *

In connection with the announcement that A. V. Roe Ltd. had decided to abandon the title "Tudor" for the Mk II aircraft which was made in *Flight*, October 7th, A. V. Roe have pointed out that all Tudors at present in existence will continue to be known by this name. An entirely new name is to be given to the freighter aircraft now under development.

* * *

Following the appointment of Mr. M. F. Coop, B.A., as Secretary of the Dunlop Rubber Co. in succession to Sir Charles Tennyson, as announced in *Flight*, October 14th, Mr. H. D. B. Eaden has now been made head of the company's legal department in which he served as assistant to Mr. Coop when the latter was head of this department. During the war he served with the Fleet Air Arm and won the D.S.C.



NASAL TRACTION: This photograph shows the Curtiss-Wright T-35 Typhoon airscrew turbine installed in the nose of a B-17 Fortress for testing purposes as mentioned in "Flight", October 21st. The jet outlets can be seen beneath the aircraft.

Anglo-American Civil Air Relations

A Review by the U.S. Civil Air Attaché of Developments in Civil Aviation During the Immediate Post-war Period

MEMBERS of the Aircraft Recognition Society were indeed fortunate to hear from Mr. L. Satterthwaite, American Civil Air Attaché in London, before he leaves to take up a new appointment in Washington, some of the inside story of civil aviation developments. At the Royal Aeronautical Society on October 20th, he explained in a characteristically informal manner some of the difficulties which arose through divergent views of the United Kingdom and the United States on the organization of civil aviation towards the close of the war. His review started with the problem which confronted both countries in 1943 of how international aviation could be handled politically, economically and geographically.

Apart from natural difficulties through geographical differences, there were strong views in each country of how civil aviation should be handled. The United States was divided in opinion as to whether air transport should be organized on a government basis through a single company; whether there should be a single "chosen instrument," a private company; or whether there should be unfettered competition. The U.K. had sought to include in their organization, he said, the Commonwealth and Dominions before attempting international expansion, and in 1943 a Dominions Conference was held in London under Lord Beaverbrook to discuss civil aviation problems. The United States did not reach any conclusion on a suitable organization except that international civil aviation should be organized on a world-wide basis.

Since there were obvious differences in opinion, U.S. proposed a Conference which was held in London in March, 1944, between the U.S. and the U.K. to discuss relevant problems. No decisions were reached, but at the discussions the various viewpoints were made known, and Mr. Satterthwaite, who was present, said the British stood by their opinion that development should be controlled through agreement between states. At the same time the U.S. made known their fears of too much control, which was thought to be more dangerous than too little control.

Before the war ended, civil aviation was already functioning, and as both countries tried to improve their positions internationally, it was obvious that some agreement on development was essential to avoid chaos in the future. In the autumn of 1944 the U.S. invited all countries of the world, other than ex-enemies, to a Conference in Chicago on international civil aviation.

After five weeks of discussion, which resulted in no final agreement, the United States proceeded to make bilateral agreements with other countries while the United Kingdom developed the Commonwealth system as far as possible. The result was a race between the two countries to obtain terms which would benefit their own particular ideas of development.

Unofficial Influences Aid Solution

Mr. Satterthwaite then revealed that from the time of the very first Conference in 1944 there had been underlying forces at work to bring the two countries to some halfway compromise. He thought that the part played by such forces in the eventual solution had never really been fully appreciated.

During this time of controversy it became apparent that some organization was needed which would settle differences on a company level and so avoid the interference of national feeling, since the two countries appeared determined to establish different domestic organization. Rather naturally, the International Air Traffic Association was an organization which might be suitable, but since it was European in outlook the United States regarded it with some mistrust. About this time in London an organization was formed and named the Conference of International Air Transport Operators (CIATO) which, although having many leading airlines as members, was untried and unknown. It had, however, a broader outlook than IATA, and the United States looked upon the organization as one through which the opposing policies could be ironed out. Eventually CIATO was absorbed by IATA, a step which had the effect of bringing IATA up to date in international aviation. The new organization became known as the International Air Transport Association.

By the time the Bermuda Conference was called in 1945 IATA was an organization worthy of being entrusted with the job for which it had been formed. By that time also the U.S. had climbed down from the extreme view of uncontrolled world-wide competition to accepting certain restrictions on capacity but not on government rate control. Similarly, the British compromised on frequency and capacity determination provided the rate question could be solved. It was then clear that if the two countries could agree on a method for handling the rate problem then there would be a definite improvement in relations. Mr. Satterthwaite gave a brief description of the terms of the Bermuda Agreement and explained how it was attacked in the United States on the ground that American airlines had been sold to the British. Similar attacks were made upon the agreement in the United Kingdom, but on the opposite score.

Multilateral Agreements Desirable

Although there was agreement between the U.K. and the U.S. at Bermuda, there was not any agreement upon the relationship between either and any third country. Thus, both the British and the U.S. made non-Bermuda type agreements with other countries. It was then appreciated that a multilateral arrangement was necessary, and that in the meantime the U.S. and the U.K. must make arrangements with third countries in conformity with Bermuda, and further to provide for consultation in the event of either country finding it difficult, when dealing with a third country, to maintain Bermuda principles. Attention was then drawn to the unsuccessful meeting at Montreal in 1947, when the International Civil Aviation Organization Conference discussed multilateral agreements. The lecturer thought, however, that it came close enough to convincing everyone that there was a chance of succeeding eventually and a meeting was arranged to take place at Geneva in November, 1947. The U.K. and the U.S. then stood steadfastly to Bermuda in making agreements with other countries with the result that, by the end of 1947, each had gone a long way towards making multilaterally acceptable forms of agreements throughout their spheres. Since agreement was not reached even at Geneva the U.S. and the U.K. had continued to make bilateral agreements on the Bermuda principles, and Mr. Satterthwaite observed that both countries had solved their major civil aviation differences for the present and also for the foreseeable future. Although there were still minor differences of opinion, both nations hoped that much had been done to pave the way for a successful multilateral agreement.

In answer to one question, Mr. Satterthwaite said that higher frequencies could not be expected until the systems of approach were improved. High landing rates in all weather conditions would be achieved as airports were improved, and as landing systems and techniques were developed. He thought also that airborne equipment would become more reliable and that as each item was slowly improved so the landing rates would become more frequent, but there would not be a dramatic change in any one which would materially affect operational efficiency. He did, however, feel that as the speed and operating heights increased so improvement would take longer. The knotty problem of how airlines could become paying concerns was thought to be, by Mr. Satterthwaite, a matter of reducing the fares in order to increase the volume of traffic and of reducing documentation to cut down time and staff. He also explained in very brief terms how the subscriptions for ICAO members were worked out on a complicated formula and rates were not merely dependent upon the size of the country or the number of airlines which were operated. One member of the audience was at a loss to understand how one American domestic airline had re-equipped itself with Constellations at the same time as another American airline operating on international air routes, and whereas the former had made a profit the latter had operated at a loss. He explained that the type of aircraft used was not the only factor which determined profits or losses. The particular domestic airline referred to was operating on particularly lucrative routes, and the president of that company had been known to declare that the airline made its money out of some two million dissatisfied customers. The Aircraft Recognition Society was deeply indebted to Mr. Satterthwaite for an extremely interesting lecture and discussion.

Fokker To-day

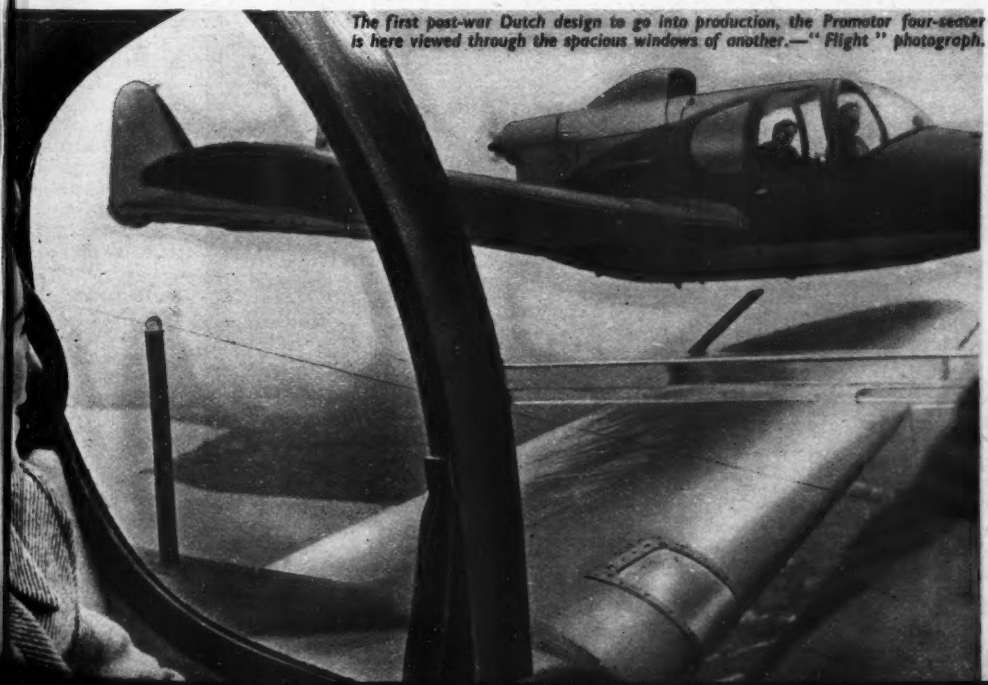
Fokker T.8.W. seaplanes of the Royal Dutch Naval Air Service operating with the Royal Air Force at the beginning of the late war.

Holland's Reconstructed Aircraft Industry : The New Combined Company : Four New Trainers

By Wing Commander Maurice A. Smith, D.F.C.

IF one thinks back to the earliest days of flying, certain names come to mind at once as being associated now and for all time with man's initiation into the faculty of controlled flight in powered aircraft. Some of these names have ceased to be associated actively with aircraft to-day, but an exception is that of Fokker. By no means the first of the constructor pilots, and at one stage no friend to this country, A. G. Fokker was nevertheless a pioneer—responsible over a period of years for several remarkable innovations.

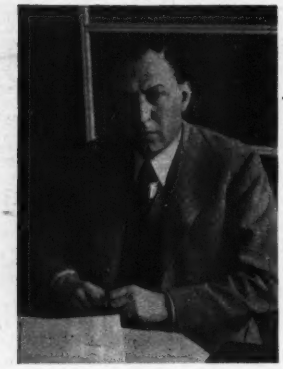
Space does not permit us to give the history of his activities and long association with aircraft, but a brief summary will revive some interesting memories and serve to give a



The first post-war Dutch design to go into production, the Promotor four-seater is here viewed through the spacious windows of another.—"Flight" photograph.

The Amsterdam factory of the Fokker company was a sorry sight after wartime air raids.

Fokker To-day . . .



Managing director Mr. P. J. C. Vos, O.B.E.

Chief designer and technical director, Mr. M. Beeling.

background to the company which still bears his name.

Around 1910 Fokker, an enthusiast and pilot, built his first monoplane, nicknamed "The Spider." This machine was moved from Amsterdam during the late war by the Germans, and was subsequently destroyed by Allied bombing, but a reproduction hangs to-day in one of the buildings which now occupy much the same position in the Papaverweg as did the original factory.

His next aircraft of interest was a swept-wing monoplane design with plenty of dihedral and "no warping." It climbed well and, with a Russian lady as pilot, it set up a feminine altitude record of 6,600ft. However, in spite of the "daring bankings" executed by Fokker, his aircraft lacked lateral control and he narrowly escaped death following a nose dive and a crash which killed his passenger.

Fokker was unable to interest the British authorities in his products in the period just before World War I, but a near copy of a French Morane monoplane, built during the war, was acknowledged to have a very good performance. During the Great War, therefore, he built his aircraft in Germany, and his well-known triplane and the D.7 biplane with 160-h.p. Mercedes engine, were among the

Two of the main lines at Amsterdam are now concerned with Promotor production and Dakota conversion.

best fighters to be used by the Germans. Fokker was the first to use welded steel construction, and was the pioneer of the ply-covered wing. His aircraft were also the first to carry guns firing through the airscrew.

After the Armistice, the nucleus of the Fokker factory was permitted, somewhat surprisingly, to entrain and move into Holland, although it was not clear whether Fokker himself had become a German national or not.

The closing of the E.L.T.A. exhibition in Amsterdam in 1919 provided Fokker with his first Dutch factory, a wooden structure on the Papaverweg, and the Dutch Fokker company was founded. In the lean period of the late '20s, Mr. A. G. Fokker spent some time in America, and with the taking out of naturalization papers his nationality seemed for the second time to be in doubt.

Between the wars the Dutch company produced many important military and civil designs. Most of the later military types were destroyed just before or during the occupation, but some of the civil designs and trainers are still flying. A few Dutch Air Force crews, some complete with their Fokker T.8.W. floatplanes, escaped and operated with Coastal Command.

Immediately before the war the Fokker G.1 twin-boom fighter and the D.21 fighter, both with Mercury engines, and the T.5 and 9 bombers, looked particularly promising. The D.23 push-pull fighter was another very interesting

A promising Hercules-engined long-range bomber produced immediately before the war was the T.9. It resembles the H.P. Hampden.

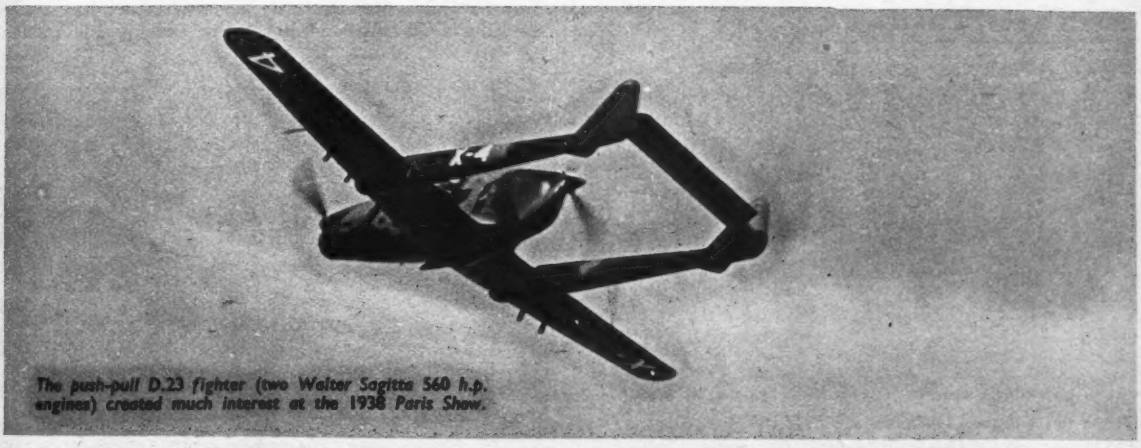
design. Mr. Fokker, managing director of his company, died in December, 1939.

During the Second World War, 1940-45, Holland's factories, occupied by the enemy, were heavily bombed, and among those destroyed and looted of equipment was the main Fokker plant at Amsterdam. With the liberation, the Dutch aircraft industry, therefore, had to start again from the beginning, at a time when difficulties and shortages of every kind existed. In spite of them, a new temporary factory was erected, on the site of the one destroyed, in twelve months.

The need to rebuild the Dutch aircraft industry was a national one. A company, the N.V. Vereenigde Nederlandsche Vliegtuigenfabrieken Fokker, was therefore formed at the earliest opportunity from the nucleus of Fokker's technical staff, from the De Schelde company and from N.V. Aviolanda. A Government committee (Ministry of Transport sponsored), the N.I.V. (Netherlands Aircraft Development Board) was also set up to advise, approve, place development orders and recommend financial support where appropriate. Incidentally, when the Dutch Pander company closed down before the war, the staff was split up between De Schelde and a small concern, Lambach. The names of Koolhoven, the important pre-war producer whose factory was destroyed, and Lambach, are not included in the formation of the new semi-national merged company.

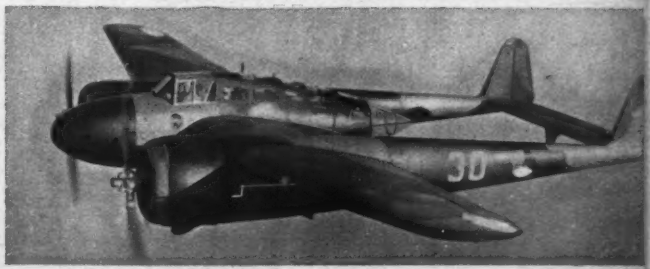
The new company's board of directors still awaits the appointment of a Government representative for completion. The managing director is Mr. P. J. C. Vos, O.B.E.; Mr. M. Beeling is director and chief designer; Mr. W. van der Laan is the works director at Amsterdam; and Mr. P. A. van der Velde is director of the Papendrecht factory.

During the war a proposed two-engined civil transport, the Fokker F.24, was improved as a design, and had manufacturing facilities been available in 1946 it might have been built for the Dutch operators. Construction of a prototype was, in fact, commenced early in 1940, but further development was stopped by the war. It was to have been a high-wing design to carry 36 passengers and a crew of three, and the intention was to use two Wright Cyclone engines. The span was 108ft 3in, the length 71ft 10in, and the wing area 969 sq ft; an all-up weight of 42,990 lb was foreseen. Calculated performances were: maximum speed 292 m.p.h.; cruising speed 230 m.p.h. at 10,000ft, and the range 930 miles. However, the earliest estimated date for delivery of a prototype F.24 was, at that time, April, 1949, so in its stead K.L.M. reluctantly ordered the American Convair 240, which was then



The push-pull D.23 fighter (two Walter Sagitta 560 h.p. engines) created much interest at the 1938 Paris Show.

Another Fokker twin-boom fighter, the G.1, with two Bristol Mercury engines, had many outstanding characteristics. There were two rear gunners.



The Fokker F.24 36-passenger transport for K.L.M. Production had been commenced early in 1940. Cyclone engines were specified.

scheduled for delivery in July, 1947. The first two were delivered recently but are not yet in operation. According to a statement made by the company, the original design of the F.24 was again slightly modified after the liberation and adapted to new requirements.

The present main factory—there is a subsidiary at Papendrecht—is temporary, and is by no means ideal for the work. There is no airfield and all traffic must cross the water by ferry boat to the city of Amsterdam and to Schiphol airport a few kilometres to the south. With government aid a fine, new, modern factory is planned

Fokker To-day . . .

("Flight" photographs and drawings—copyright)

The prototype of the S.11 Trainer at Schiphol (note the Grumman Mallard in the background). The second machine, differing in detail only, is now flying. The engine is a 190 h.p. Lycoming flat six. Despite a tail wheel layout, both pupil and instructor have an excellent view for taxying.

to be built as an extension to Schiphol, and it will probably have its own main runway.

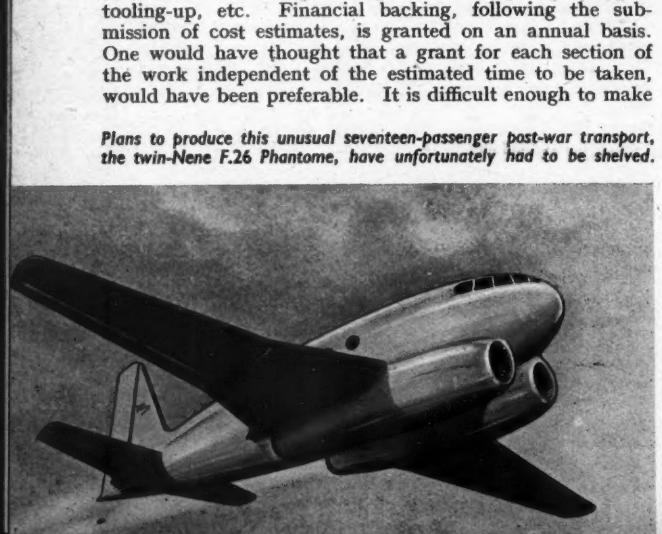
The procedure for ordering and building aircraft in Holland to-day bears a slight resemblance to our own. If a subsidy is to be granted, N.I.V. approval is given to proceed one stage at a time: design study, wind-tunnel model and mock-up, complete drawings, prototypes, tooling-up, etc. Financial backing, following the submission of cost estimates, is granted on an annual basis. One would have thought that a grant for each section of the work independent of the estimated time to be taken, would have been preferable. It is difficult enough to make an accurate cost estimate these days without bringing in the complication of a time factor. Moreover, each new vote and estimate requires additional N.I.V. conference, and must presumably result in waste of time and effort.

In the event of substantial orders from home and abroad producing good profits from any particular aircraft design, it is understood that the company might be asked to repay to the Government part of the development subsidy.

As soon as facilities became available, the reorganized Fokker company started work on repairs, rebuilding and overhauls of civil and military aircraft. Large numbers of Dakotas in particular, and Skymasters have been converted for home and foreign use. An agreement with the Douglas company makes Fokkers the European service and repair agent for Skymasters. Dakotas are going through for France, Switzerland, Belgium, Portugal and Finland. In addition, all Dutch Army and Navy repairs are being undertaken. More than a hundred surplus American Harvards are being overhauled for the Swiss Air Force, and a licence to manufacture spares for them has been granted. A contract has also been signed with the Belgian Air Force for repair work. In the works at present one may see Ansons, Harvards, Oxfords, and a Spitfire or two, in addition to the civil types.

A fair amount of glider work is also being undertaken in the Amsterdam factory, and 72 gliders of four different types are being produced. They are the E.S.G. enclosed primary glider, the Dutch version of the Grunau Baby, the Dutch Olympia and the Gövier side-by-side trainer.

Plans to produce this unusual seventeen-passenger post-war transport, the twin-Nene F.26 Phantome, have unfortunately had to be shelved.



The remaining capacity is given over temporarily to motor coach construction. This work serves to keep the Fokker team—the total of employees is now about 2,000—together in useful employment and to add to experience until the new Fokker designs reach the production stage, as the first are now doing.

A small section of the plant at Amsterdam is set aside for the training of works apprentices. Students spend part of their time at work in the factory and part at lectures. They are given a small wage and help to offset the cost of their training by fabricating small and simple parts in wood or metal.

The Dutch are keen subscribers to the view that within the Western European Union military equipment should be uniform, and for this reason in particular, and because Dutch factories are more vulnerable in the event of an attack from the East, and their technicians less experienced in the designing and building of modern high-performance military aircraft, it is felt to be better to concentrate at this stage on the development of modern trainers. In addition, small-scale production under licence of suitable British fighters is planned. These opinions are reflected in practice by the present trainer programme and the licensing agreement which has been made by the Dutch Naval and Army Air Forces for the building, as soon as possible, of Hawker Sea Furies and Gloster Meteors respectively.

An initial order for twenty F.25 Promotor four-seat taxis,

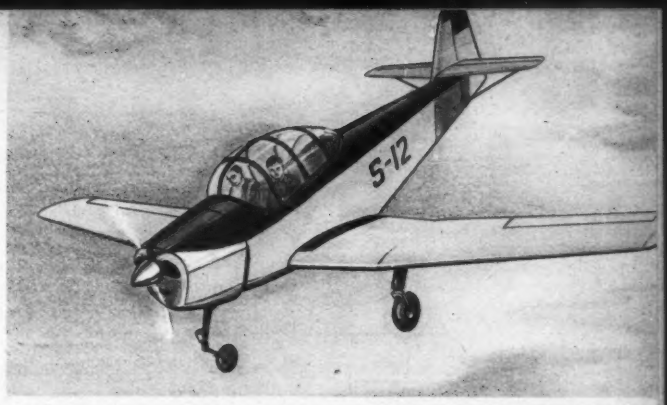
or "business-planes" as they are called, mainly of wood but partly of metal construction, is at present going through at the Amsterdam factory, and five or six are now flying. This unusual twin-boom design, comfortable and roomy, with car-type door and large cabin windows offering an exceptional field of view, has created a great deal of interest in France and other European countries. Its equipment, including radio, is good, and if any criticism at all is to be levelled at it, the long take-off run with full load would probably be singled out. The rather low cruising speed would probably not suit every potential customer, but is adequate for its purpose of European inter-capital executive transport. A description and handling notes appeared in *Flight* of August 5th, 1948.

Another important post-war design is the S.11 Instructor, which is to be put into production for the Dutch Air Force. The prototype of this two-three-seater trainer has been flying for some months, and number two aircraft, differing in detail only, recently took the air for the first time. Although these machines are still in the development stages, flying trials have almost been completed by Mr. Sonderman, chief test pilot and personal pilot to Prince Bernhard. Incidentally, he attended number five course at the Empire Test Pilots' School.

Flight was able to fly the prototype S.11 from Schiphol recently and to sample its stalling, spinning and aerobatic characteristics. The third seat was not fitted. It was agreed that no complete appraisal should be written until we had flown the modified number two aircraft in finalized form. However, this first experience served to indicate that the S.11 is particularly pleasant to handle on the ground, offers a fine outlook all round and, in general, performs well. For an elementary trainer the stall and spin of the prototype is on the abrupt side—resembling the Harvard—but this will be made much gentler by small adjustments to the production aircraft. The ailerons are light and effective, and the S.11 rolls very nicely.

A 190 h.p. flat six Lycoming with an automatic v.p. airscrew is fitted, and this gives the trainer a modest but adequate performance. Initial climb is quite good, but the rate falls off quite rapidly as aerobatic height is reached. The estimated figure for climb to 1,000 metres (3,280ft) is 6.2 minutes. On the prototype the cruising speed is 105/110 m.p.h. (The A.S.I. reads in knots.) The span, length, height and wing area are respectively 36ft 11in, 26ft 7in, 7ft and 194 sq ft.

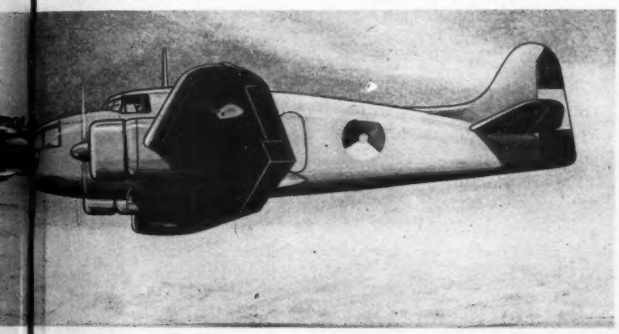
The first production Instructor is expected early next year and the rate of delivery will peak at ten per week. Construction is primarily of metal, the fuselage framework being of welded steel tubes with fabric covering. The engine is removable with its tubular mounting as a unit forward of the bulkhead. The fixed, levered main legs are rather unusual in appearance, protruding well forward of the wing leading edge like knees. The springing is very soft, and the aircraft takes on "bank" on the ground when brake is used to assist turning. A steerable tail-wheel and hydraulic brakes are fitted. Two fuel tanks of 31 gallons capacity each are located in the wings.



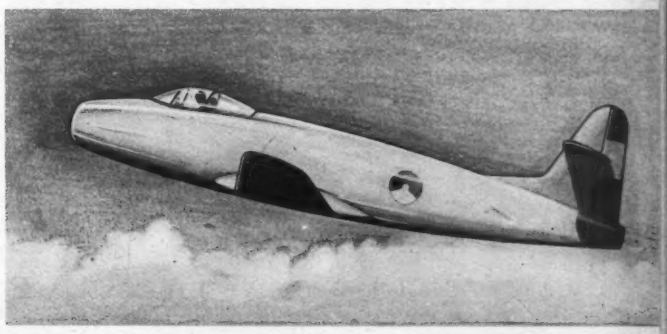
A possible development of the S.11 Instructor is the nose-wheel-equipped S.12. A prototype is at present under construction.

An alternative version of the S.11 is known as the S.12, the first of which should fly quite soon. There is practically no difference between the two except that occasioned by the fitting of a nose wheel. In this case also the engine, nose wheel and mounting are detachable as a unit. That the S.12 is well proportioned may be judged from the accompanying drawing.

Another Fokker trainer to reach the design and mock-up stage is the S.13, which is to replace Ansons and Oxfords as standard, advanced, all-metal, twin trainer for pilots and crews. It is to be powered with two 600 h.p. Pratt and Whitney Wasps, and to have a retractable nose-wheel undercarriage. When used as a crew trainer a bomb-aimer's position will be in the nose, a radio operator's seat and table on the starboard side of the mid-fuselage, and, on the port side, a navigator's station. In addition to these there are seats for an instructor and two pupils. For advanced pilot training side-by-side dual controls are fitted. The total complement for any of its duties is six. Performance estimates mention a maximum speed of 217 m.p.h. and a cruising speed of 190. The span is 63ft, the loaded weight 12,700 lb and the wing area 495 sq ft. The total fuel capacity is 310 gallons.



The new S.13 crew and advanced pilot trainer will carry a total of six. The engines are Pratt and Whitney Wasps.

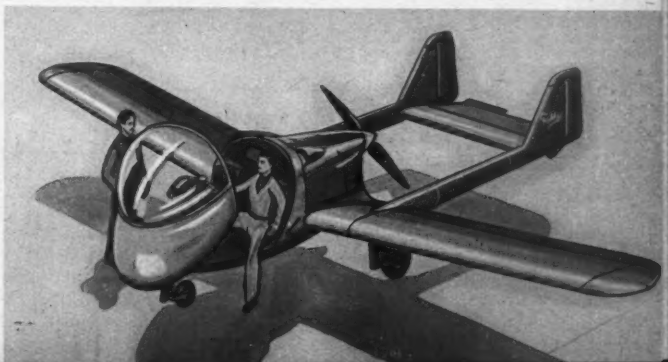


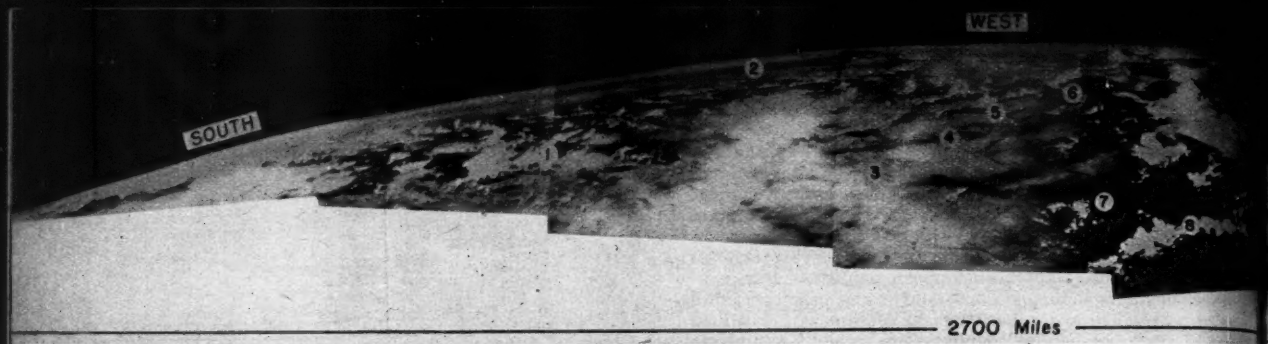
The new Fokker jet trainer, with Rolls-Royce Derwent engine, has reached the mock-up stage. It is unnamed and known as the S.14.

Completing the range of trainers from elementary to

(*Concluded on page* 525)

The unusual method of entry and exit is a feature of the Fokker Partner two-seat pusher designed as a small brother for the Promotor.





This mosaic, made from photographs taken by an automatic camera attached to a V2 rocket, portrays a portion of the earth's surface having an arcuate chord of 2,700 miles—nearly one eighth of the circumference of the globe.

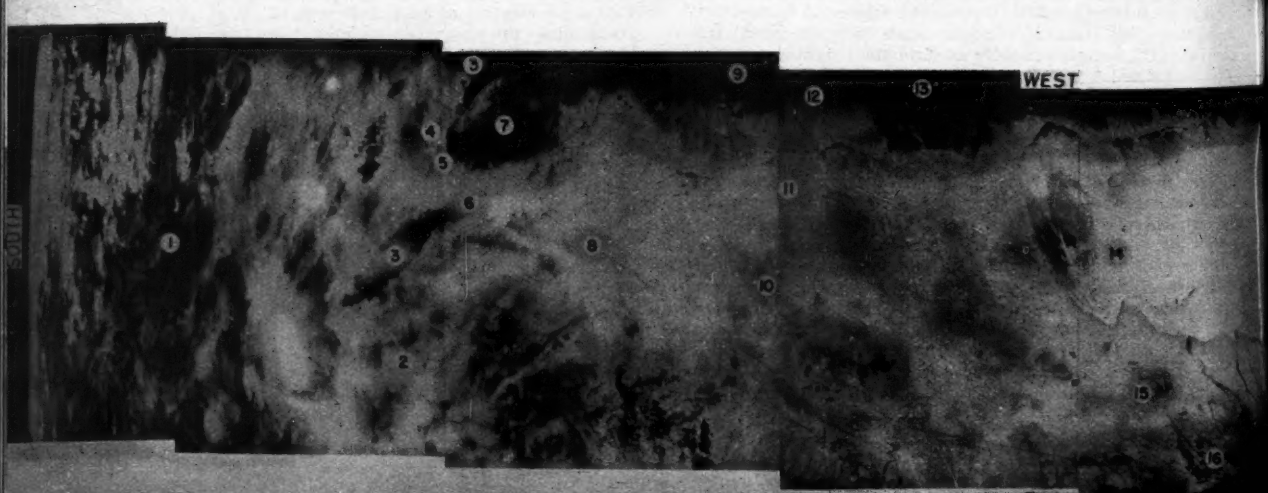
Rocket Cameras Record Earth's Surface

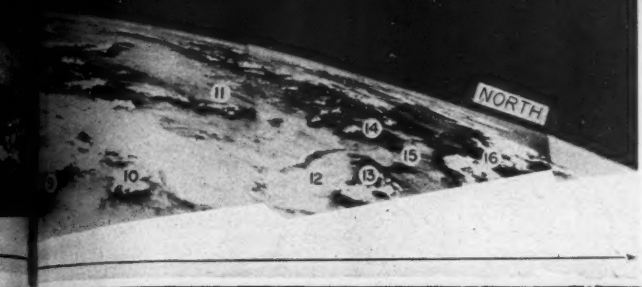
DURING experiments recently carried out in America these amazing photographs were obtained by attaching automatic cameras to an Aerobee rocket and a German V 2, which reached heights of 70 and 60 miles respectively.

Even the inhabitants of Rudyard Kipling's "Village that voted the Earth was Flat" would find it difficult to explain away the curvature shown in the top mosaic. This was taken from a V2—(1) Mexico; (2) Gulf of Mexico; (3) Londsburg, New Mexico; (4) Peloncillo Mountains; (5) Gila River; (6) San Carlos Reservoire; (7) Mogollon Mountains; (8) Black Range; (9) San Mateo Mountains; (10) Magdalena Mountains; (11) Mount Taylor; (12) Albuquerque, New Mexico; (13) Candia Mountains; (14) Valle Grande Mountains; (15) Rio Grande River; (16) Gangre de Cristo Range.

The 1,400-mile strip shown at the bottom of these pages is made up of a number of photographs taken from an Aerobee at an altitude of 57 miles approx., and the area recorded extends from Upper Wyoming to Mexico: (1) Mexico; (2) Texas; (3) Rio Grande River (note that this is indicated in three places); (4) Cuidad Juarez, Mexico; (5) Elpaso, Texas; (6) Biggs Field, Army Air Base; (7) Franklin Mountains; (8) Southern Pacific Railway; (9) Oregon Mountains; (10) Tularosa Basin; (11) V2 and Aerobee Launching Sites; (12) Base Headquarters, White Sands, New Mexico; (13) San Andres Mountains; (14) White Sands National Monument Area; (15) Alamogorda Army Air Field; (16) Alamogorda, New Mexico; (17) Tularosa, New Mexico; (18) Sacramento Mountains; (19) Malpais or Ancient Lava Beds; (20) Test Site for First Atomic Bomb; (21) Alburquerque, New Mexico; (22) Areas of Wyoming.

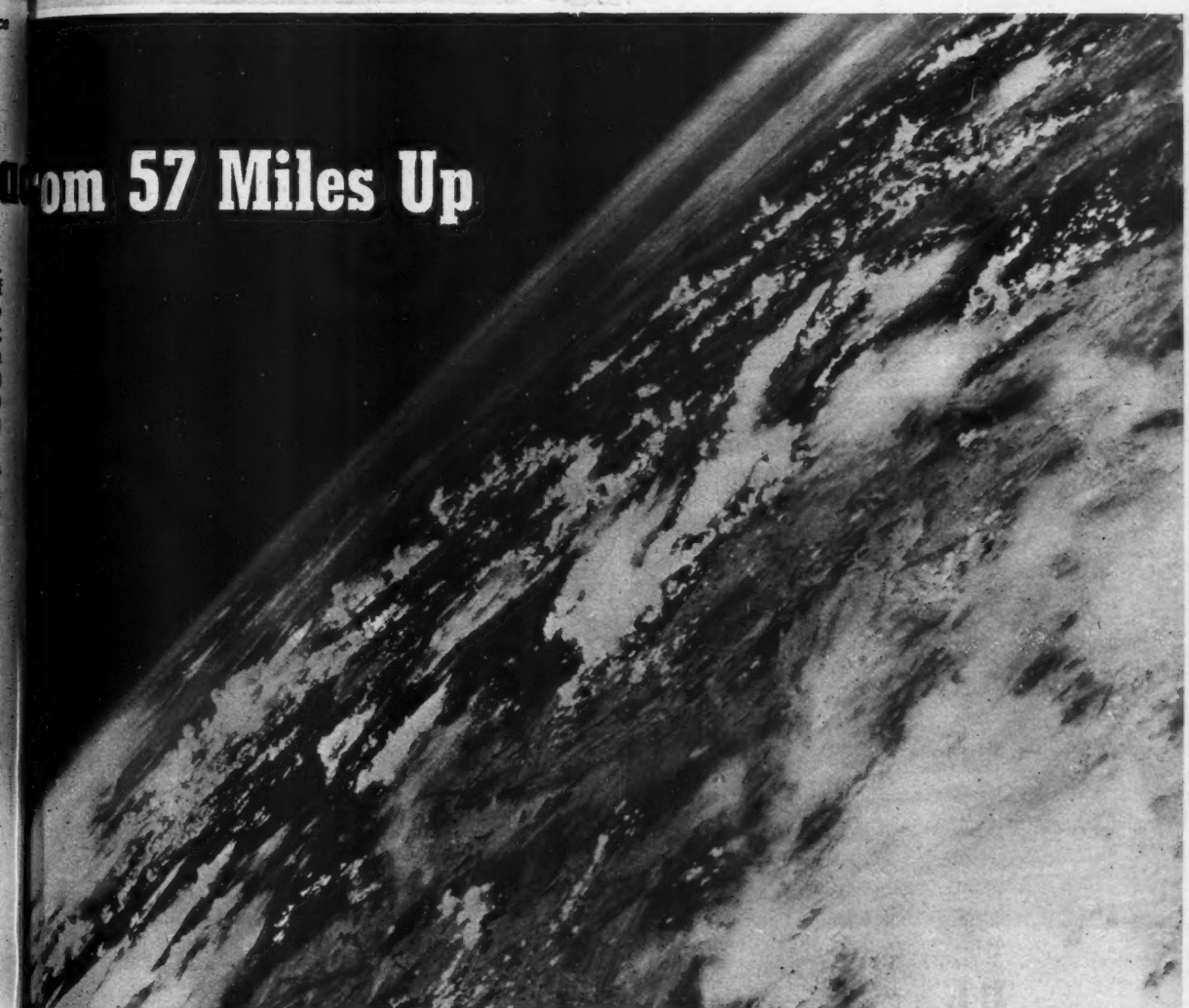
Mr. C. T. Holliday, of the applied physics laboratory, Johns Hopkins University, Maryland, with two of the cameras used in the experiment. When retrieved both were still in perfect working order but the one on the left, which was attached to the Aerobee was somewhat battered.



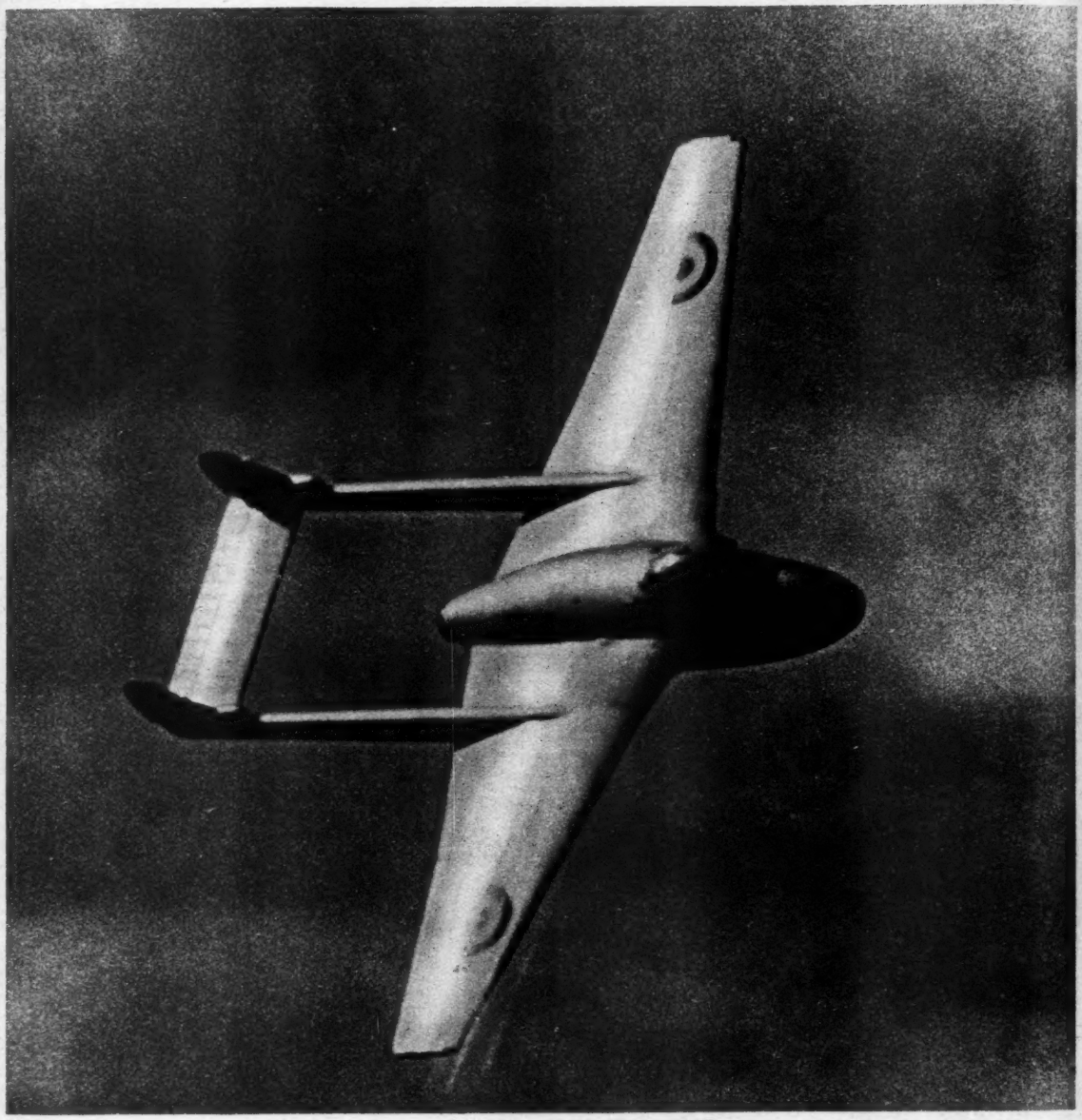


Below is an enlarged portion of the composite photograph on the left. It shows the area on the left of the numeral 1.

om 57 Miles Up



Covering ground measuring 1,400 miles from north to south, this strip must be the first composite photograph ever to show the two opposite horizons at the same time. Taken from an Aerobee rocket, it stretches from Mexico to Wyoming.



Photographic Phenomenon

THE action study on this page, showing John Derry in a de Havilland Vampire 5, during one of his never-to-be-forgotten S.B.A.C. demonstrations, exhibits a strange manifestation in the region of the starboard wing tip. It will be seen—and the original leaves no doubt on this score—that what appears to be a ghostly reproduction of the wing tip has been recorded by the camera forward of, or below, the structure itself. This may be interpreted as the result of a "tuning fork" oscillation or as the product of shock waves. No such image is seen at the port tip. A point of special interest is that, assuming that the "ghost" is, in fact, a reproduction of the wing tip, a highlight, corresponding precisely with that on the wing proper, is readily apparent. That the stiff, clipped wing of the Vampire 5 could be distorted to such an extent in some thousandths of a second seems incredible but, in this connection, it is worthy of note that, during a series of record runs by a North American F-86 fighter, at speeds in the region of 670 m.p.h., wing "flutter" was clearly visible to observers on the ground. The wing of the F-86 is swept back 35 degrees and is immensely strong.

In the possible case of the phenomenon being the visible sign of a shock wave building up, the cause could be the compression forward of the wing changing the density—and therefore the index of refraction—of the air in that region. If this were so—and bearing in mind the direction of the sun's rays—a reflection similar in outline to the wing would be expected.

We shall be glad to publish our readers' comments as to possible causes.

CIVIL AVIATION NEWS

RUSSIAN TARMAC : At the Central Airport in Moscow. In the background the passenger buildings can be seen while in the foreground is an IL 12. Reports claim that in 1940 Russian civil air routes covered 85,000 miles and a forecast has been made that by 1950, they will be increased to 110,000 miles. It is optimistically claimed that the longest air route, that of over 4,000 miles, can be flown in a day.

Charter Aircraft Shortage : Ultra Light Aircraft Association Purchases Tutors : Still Heavier Constellations

AIR EXCHANGE MEETING

ON Wednesday, October 20th, a meeting was called on the Baltic Exchange by the Committee of the Air Freight Section. Good progress was reported in the development of the air freight market through its approaches to various Government organizations. Through them many overseas charterers have been made to appreciate the value of the exchange. The Baltic and British Air Charter Association Committee have completed work on the Baltairvoy charter (a standard charter party agreed by the Baltic Exchange and the Air Charter Association for single freight voyages) and it is hoped it will be in general use in the very near future. Members of the Baltic were sounded on the formation of an Air Brokers Association to which proposal all those members present expressed themselves in general agreement in principle. Final details will be discussed at a further meeting of the Baltic Exchange in the first week in November.

An important question on Government chartering was raised by some members of the Committee. The British Government charters aircraft from time to time through the airline corporations and not through the Baltic Exchange. The corporations decide which charter company shall be used, and many members felt that by such a method the Government did not obtain the most favourable rates, especially since most of the work was allocated to one or two of the larger companies. Although the corporations were of the opinion that they were the best judges of reliability, it was apparent, the members thought, that by placing all Government chartering on the Baltic Exchange they would receive more favourable rates and still retain their rights to pick and choose if they so desired. It would also give the Baltic Exchange stronger powers and assist in its development.

EFFECT OF BERLIN AIR LIFT

ALTHOUGH a few more charter aircraft have recently become available for normal business there is still a general shortage owing to the number of freighters employed in the Berlin air life. Heavy freighters are still unobtainable and the pressure of enquiries for fruit carriage from Spain and North Africa is increasing. It is improbable that very much fruit will be flown from Spain this season as Dakotas, although available, are unable to fly at the rates required. Offers of Vikings at competitive rates have been made, however, and since they have recently been making return flights from Africa without cargo it is possible that arrangements will be made for them to lift fruit from Sicily. Charterers have been requested to offer aircraft to fly 50,000 tins of lubricating oil in quarter gallon tins from New York or Philadelphia to Amsterdam.

DUTCH CONVAIR AT HEATHROW

IN the course of normal route test-flying one of the new Convair 240 transports recently delivered to K.L.M. flew the 230-mile journey between London and Amsterdam in 64 minutes. Actual flying time between the airports was 48 minutes, giving an average ground speed of 288 m.p.h. This flight was made in normal conditions and not with a strong tail wind and is representative of expected normal operation over that route with the Convair 240. The K.L.M.-operated DC3s take 1 hour 40 minutes, and the DC4s take 1 hour 30 minutes. Since the new aircraft will carry about 36 passengers instead of 21 as do the DC3s, there will be an extra lift and more frequent services will not be immediately probable when services start next year. K.L.M. have 12 of these aircraft on order, two have already been delivered and on them 25 senior captains have already been trained. The Company intends to train a total of about 100 senior captains for operating the winter services and during next year the less senior captains will also be converted.

The phenomenal climb of the "240" has made an impression here, not only upon those who have flown in it but also on others who have watched from L.A.P. With a take-off weight around 39,000 lb and only a slight wind, this transport becomes airborne after about 15 seconds from a standing start and the rate of climb is such that before the end of the runway at London Airport the height was about 1,200 feet. In the climb, which can be made at anything between 125-147

Civil Aviation News . . . . .

knots the rate can be from 1,200-1,800 feet per minute. The landing run is, of course, also short when reversible pitch is used. It is rather interesting that cylinder head cooling is maintained even when reverse pitch is in operation, a feature which cannot be claimed with other installations. Such cooling is achieved through a system by which exhaust gas pulsations induce the cooling air over all cylinders by means of the augmenters. Direction of slipstream therefore has no effect upon cooling.

Noise level in the cabin is normal, it has been reduced quite recently by the extension of the exhaust augmenters by about 18 inches. Large windows permit a good view from all seats and passenger comfort is at a high level. It is perhaps unusual to have the servery in a forward position on a medium-range aircraft but undoubtedly that position, near the C. of G. will be more popular than a tail position, with stewards and stewardesses. Progress with the Convair 240 will be interesting to follow and its economic possibilities will be watched with considerable interest especially by British operators.

AIR FRANCE EXTENSIONS

ON October 26th Air France opened a new route from Paris to Madrid with Languedoc 33-seater aircraft. The flight takes just under four hours and the fare from London through Paris is £19 13s single and £35 7s return. The service will be flown twice a week in both directions. Since the ten-year travel ban on Spain has been lifted Air France have opened routes to Barcelona and have included Madrid in the weekly service between Paris and Buenos Aires. More and more services for passengers and freight are planned to link important industrial centres in France with the principle North African towns. This is part of a policy of the French Government aimed at closer integration of the North African territories of Algiers, Tunisia and Morocco in the economic system of Metropolitan France. New stopping places at Lyons, Marseilles, Nice, Nantes and Bordeaux are included in the connections between Paris and Algiers, Tunis, Oran and Casablanca. There is also co-ordination of services between Air France and Air Atlas, which operates over the Barbary coast from Tunis to Casablanca. Languedocs will be used on all services except from Paris to Casablanca which will be operated with Douglas DC4s, starting on November 2nd.

U.L.A.A. ORDERS TUTORS

NEGOTIATIONS are now in hand which should lead to the placing of an early order for six Motor Tutors for the use of Ultra Light Aircraft Association groups. These machines should be allocated to selected groups before next Easter. On the basis of flying a minimum of 150 hours per annum and insurance costs at about £50 per annum, it is estimated that flying rates will be at £1 per hour. Purchase of these six Tutors has been made possible by a grant from the Kemsley Trust Fund, a proportion of which money had already been advanced to the U.L.A.A. for the purchase of a batch of J.A.P. motors. The Association has repaid some of the previous loan, believed to be the first beneficiary under the scheme to do so. Sir Alan Cobham and Mr. P. W. S. (George) Bulman, who were, of course, flying ultra light aircraft some 25 years ago, have agreed to serve as Vice-Presidents of the U.L.A.A.

CIVIL AVIATION PRIMER

"HIGHWAYS of the Air," which is edited by V. E. Mearles, B.O.A.C.'s Education Officer, was written largely by B.O.A.C. personnel. It has been published to provide a work for use in schools dealing with the development of civil aviation, and to make available for general reading an authentic story of civil air transport, and Britain's and the British Commonwealth's contribution to its growth.

The need for such a book has been apparent for some time, to counter the popular opinion that flying is exclusively for the rich and fearless, and to answer the innumerable awkward questions which small boys ask. It is to Mr. Mearles' credit that he has produced a book which is comprehensive as far as space permits, interesting, and written in language which even the most earthbound person should be able to understand. On the subject of the British Government's desire for internationally controlled airlines the author says: "It is the belief of the British Government that there must spring so great a degree of co-operation, for the sake of everyone, that one day there will be no more competition. All airlines would in that case become part of a huge international combine. In other words there would be one world airline."

There are several mistakes, especially in the historical sections, which must be corrected if the book is to be regarded as a standard text-book on civil aviation. For example, it is rather disquieting to read in the first line of the Foreword that "It was only 41 years ago that the Wright Brothers made the first successful aircraft flight." The historic flight took place in 1903. Similarly, the Appendix giving specifications of airliners used on Empire air routes needs complete revision; but this is not surprising as even the Archangel Gabriel could not predict how the plans of our nationalized Corporations would change in the inevitable time lag between compilation and publication of such an Appendix.

Once these things have been put right, "Highways of the Air" will go a long way towards achieving its object, for it tells the story of British civil aviation modestly but with justifiable pride, backed with just enough statistics to lend weight to the narrative. It is good to read again how our airmen pioneered most of the world's important air routes, while the brief notes on the air routes of to-day are sufficient to whet one's appetite to learn more about them. The sections on "Airliners," "Airports," "Maintenance" and "Payload" give a good basic picture of each subject; that on "The Aircrew" is first class; while S. J. Webb's story of a flight to Cairo by flying boat conveys much of the delights of this form of travel. In fact, "Highways of the Air" should do much to stimulate the spirit of airmindedness that is so badly needed to-day.

J. W. R. T.

FUTURE CANADIAN TRANSPORT: The C.102 short/medium range jet transport is being built by A. V. Roe Canada Ltd. Equipped with four civil rated R. R. Derwent engines paired in twin nacelles and mounted on the centre section wing, it will carry 36 to 40 passengers and cruise at 400 m.p.h at 30,000ft.

K.L.M. FATAL CRASH

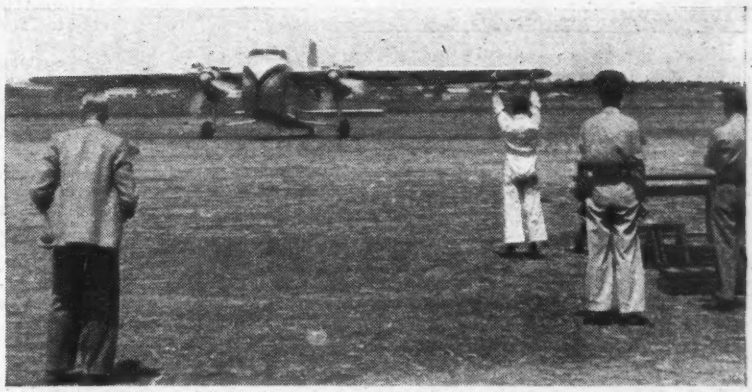
ABOUT 40 minutes after midnight on October 21st a K.L.M. Constellation crashed some two miles from Prestwick Airport after attempting to land in rather poor weather conditions. There were thirty passengers and ten crew on board the aircraft none of whom survived the crash. At the end of a normal flight from Amsterdam to Prestwick whilst *en route* for New York the commander of the aircraft, Capt. K. D. Parmentier, asked for a G.C.A. let-down. The visibility was about 4,000 yards, the cloud base was down to 300 feet. The circuit and approach were, however, quite normal and the aircraft broke cloud over the airfield. It is understood that Capt. Parmentier then informed Control that he intended to make an overshoot and proceed on a visual circuit. As far as can so far be determined the aircraft struck some high-tension cables, with the result that the machine was set on fire. The aircraft continued but eventually crashed in desolate country.

Capt. Parmentier had flown with K.L.M. since 1929 and had accumulated about 20,000 hours. In 1934 he was commander of the K.L.M. Douglas DC2 which won the handicap prize for commercial aircraft in the London to Melbourne Air Race. During the war he flew on the Bristol-Lisbon service and was invested with the O.B.E. In the Royal Dutch Airline he was Chief of Flying Services and had just returned from the first K.L.M. flight to Shanghai. Also on board the aircraft were Mr. A. Veevendaal, the managing director and technical vice-president of the company, Mr. MacInerny, European representative of the Lockheed Corporation, and Mr. Edgar Fuld, a member of the K.L.M. Board of Control, Secretary of the Royal Netherlands Aero Club, founder of E.L.T.A.,

the air exhibition in Amsterdam in 1919, and was also one of the founder members of K.L.M. The M.C.A. have already opened an investigation into the accident and the Dutch Chief Inspector of Accidents and another Dutch Government official are helping in the investigations.

CONSTELLATION A.U.W. INCREASED AGAIN

FLIGHT tests of a Lockheed Constellation at a new gross take-off weight of 105,000 lb have started. If commercial operation of the Constellation at these weights is accepted by the Civil Aeronautics Administration it will mean nearly 3,000 lb additional load capacity to those aircraft already in service after minor modifications have been made. This will be particularly beneficial to operators over long ranges. It is understood that the necessary structural modifications will add only 450 lb to the empty all-up weight of the aircraft so allowing the additional weight available for extra range or payload. It is expected that owing to the high power-weight ratio of the Constellation the greater weight will have only a negligible effect on its flying performance. The maximum landing weight will then be 89,500 lb. The old gross weight of 102,000 lb was the highest permitted by the C.A.A. for a commercial air liner. The Constellation at the new weight will be delivered as standard production by next spring but modifications can be easily performed by airlines in their own workshops to Type 749's. Special kits for the minor changes will be provided.



DOWN ON THE FARM: The Bristol Freighter of Central African Airways is about to take off from Salisbury on a flight to deliver a Ferguson tractor, for a farm demonstration at Lusaka, Northern Rhodesia.

BREVITIES

LORD PAKENHAM, Minister of Civil Aviation, travelled to Speke last week to discuss with representatives of the National Joint Council, the Liverpool Joint Panel and British European Airways management the transfer of the B.E.A. Maintenance Base from Speke to Renfrew (Glasgow).

* * *

Hong Kong Airways, one of the associates of B.O.A.C., has recently increased its international services with a weekly flight between Hong Kong and Manila, the capital of the Philippines. Although Hong Kong Airways are at present operating DC 3s it is hoped to replace them by Plymouth flying boats in the near future.

* * *

Commencing Tuesday, November 9th, COBETA (Compagnie Belge de Transports (Aeriens) will operate from Brussels to Haifa a weekly return service. There will be direct connections to existing COBETA services between Glasgow, Manchester and Brussels and SABENA services between London and Brussels. Through bookings can be made from Glasgow, Manchester and London.

* * *

B.E.A. internal services during the winter commencing October 31st will include seven flights each day in each direction between Jersey and Guernsey. There will be three return flights a day from Northolt to Jersey, two to Guernsey, a daily service from Southampton to Jersey, eighteen a week to Guernsey and two a week to Alderney. There will be two return services a day between London and Glasgow and also between London and Belfast and Glasgow and Belfast. Routes serving the Western Isles, Western Hebrides, Aberdeen, Inverness, Wick, Orkney and Shetland will have from one to three services every weekday. There will be a service betwen Lancashire and the Isle of Man and Northern Ireland, while the Penzance-Scilly air ferry will be maintained at a frequency of three times a day on all weekdays.

* * *

B.O.A.C. and Aer Lingus have arranged to give through fare facilities between Dublin and all stations on the Corporation's routes. The arrangement comes into force this month. Fares, which include the booking of hotel accommodation in London if necessary, will be normal B.O.A.C. fare from London plus £8 5s single or £14 17s return.

* * *

Although schedules have not yet been decided for the new P.A.W.A. route from Seattle and Portland to Hawaii, aproximate travelling times are expected to be: to Manila, 46 hours; Shanghai, 45 hours; and Calcutta, 48 hours. Through flights will be arranged to Australia and New Zealand, Japan, China, the Philippines, Siam and India.

* * *

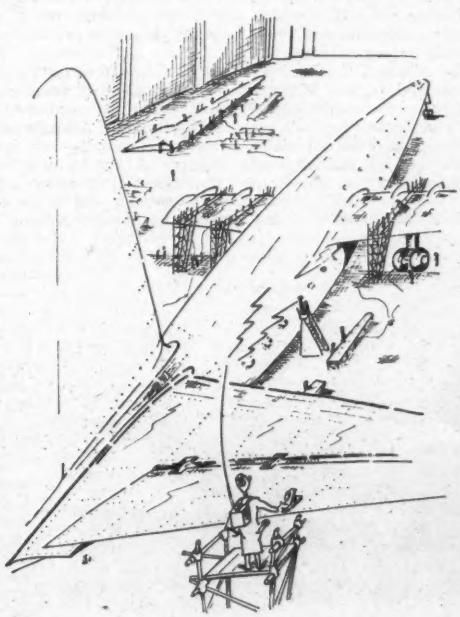
As from December 11th Swissair will open a new service from Zurich to Manchester on a twice weekly basis. The Company are also now operating DC 4 aircraft on the Geneva-Madrid-Lisbon route twice weekly. A weekly service is being planned to fly between Switzerland and Egypt once a week.

* * *

Australian National Airways have dismissed the captain of an aircraft which recently forced landed with one engine on fire. It has been reported that the pilot admitted that he forgot to operate the automatic fire extinguisher as his only thought was to land the aircraft to save the passengers. The Australian Airline Pilots' Association regard the decision as a harsh one in view of the fact that the departmental official enquiry has not yet been completed. Further action will, however, depend on the result of that official enquiry.

* * *

Weekly connections between Stockholm, Madrid and Lisbon with intermediate landing at Hamburg out-bound and at Amsterdam homeward bound will probably be included in the S.A.S. winter time tables which are timed to operate from the beginning of November. Connections between Scandinavian capitals and London, Amsterdam, Brussels, Zurich and Paris will be maintained, and three times a week there will be a Vickers Viking service to Prague and once a week to Warsaw, and also to Rome through Amsterdam and Geneva. The



"Inspector Smith calling Control—Now put stick right forward—Over"

Civil Aviation News . . . . .

service to Athens, Istanbul and Teheran will be maintained once a week by D.C-6s. On the North Atlantic there will be five services weekly until November 21st when they will be further reduced to four and the South American route will be flown twice a week by D.C-6 instead of D.C-4 aircraft.

* * *

Trans-Ocean Airlines are understood to have secured a £250,000 contract to supply six aircraft with crews and technical staff to the Pakistan airline Pak Air, Ltd.

* * *

B.S.A.A. Tudor IV, *Star Lion*, recently made three successful experimental load tests at Nassau with a total all-up weight of 80,640 lb, which is 640 lb over the normal weight. The pilot on each occasion was Lt. Cdr. Stuart, of the A. and A.E.E., Boscombe Down.

* * *

Trans-Canada Airlines are to operate a new service connecting the U.K. with Nassau and British West Indies via Montreal. Starting December 2nd, flights will be twice weekly in each direction to Nassau and to Kingston, Jamaica, and once weekly to Trinidad.

* * *

Since the opening of the K.L.M. South Atlantic Service in 1946, more than 12,000 passengers, 750 tons of freight and 20 tons of mail have been transported between Europe and Latin America. The route is flown with D.C. 6 aircraft in two days each way.

* * *

Plans are understood to have been made for a large airfield near Hanover to attract international traffic, and the Hanover municipality is negotiating with the British Military Government to obtain consent for the scheme.

* * *

As from December 1st, Belgium's pre-war airport at Evere, near Brussels, will be closed to commercial traffic, and all civil airline traffic will be diverted to the new adjoining airport at Melsbroeck. Until installations at Melsbroeck are complete Evere will continue to be used as a base by the Belgian Air Force. Afterwards it will be closed and converted into a housing estate to accommodate airline and airport employees and their families.

FROM THE CLUBS

ONLY 60 hours' flying were possible at the Strathtay Aero Club due to bad weather during September, but the membership was increased by ten during the month. The monthly dinner dances which have become a popular feature of the Club's social activities have been resumed; the annual general meeting was held on October 20th.

* * *

OVER 300 members and their guests attended the Midland Aero Club's annual ball on October 8th at the Grand Hotel, Birmingham, which proved to be the outstanding event of the year's social activities. Prizes included silver compacts and a bicycle. Monthly dances are to be held at the White Lion Hotel, Portway, and on November 3rd the lecture programme commences. The year's flying hours show an increase of 200 over the total for 1947.

* * *

AT the end of this year the Luton Flying Club is to close for an indefinite period. In making this announcement on October 21st the Hunting Aviation Group who run the club stated the reasons as being the lack of government support, the restrictions on petrol for motoring and the relatively high cost of flying instruction. Were the government to subsidize flying clubs the question of re-opening the Luton Club, which has about 300 members, would be considered.

* * *

REPRESENTING the Association of British Aero Clubs, Mr. Whitney Straight, G/C. G. H. Miles and Mr. H. Duncan Davis were received on October 14th by the Secretary of State for Air. Also present were the Under Secretary of State for Air, the Permanent Secretary of State for Air, and the Minister of Civil Aviation. The deputation protested to the Minister against the lack of official support for the clubs, that they were not being used for training pilots necessary in the case of emergency and also that they were not even officially recognized. It is understood that there was an exchange of views and the Secretary of State undertook to give due consideration to all those discussed. In fact, a working committee is being formed by the Air Ministry to discover if it is possible to use flying clubs for the training of persons for service in the event of emergency. In the post-war years the Association of British Aero Clubs has put up many alternative schemes, but schemes are useless unless the principle is first of all accepted that the clubs could be usefully employed, and it is hoped that this time the Ministries have been duly impressed. Undoubtedly they may be influenced by the lack of support for recruiting in the R.A.F. and R.A.F.V.R., and by the fact that many suitable air recruits are volunteering for service with the Army. The deputation also brought to the notice of the Minister the more efficient organization throughout Clubs in the post-war period. The A.B.A.C. has gone a long way to improve general efficiency through improved maintenance systems and a standardized training syllabus. There was no such organization before the war. The Flying Club organization throughout the U.K. must be looked upon as a necessity and not as a luxury.

* * *

SINCE last March the six aircraft of the Plymouth and District Aero Club have flown a total of 1,200 hours and several visits to the Continent have been made. Mr. R. R. Barber, of Polperro, won for the club the Camille Marot Challenge Trophy presented by the Aero Club de l'Aube at Troyes for covering the greatest distance during the year and arriving at the rally within 12 seconds of his appointed time. Membership continues to increase at a steady rate but it is hoped that the present cost of flying will be reduced before the new regulations for private pilots' licences come into force.

* * *

AIRCRAFT of the Cowes Aero Club are still active, although the summer season has closed, and a number of students qualifying for commercial licences are continuing to put in flying hours. A large number of pilots are being attracted by the exceptionally low rate of £2 per hour for the hire of an Auster Arrow which is popular with members for cross countries. Dances are being held in the club room every Sunday evening and as an experiment during the winter months, every Saturday evening as well. An interesting reminder of the Cowes Air Display held on August 22nd is that of the balloons released by the Air League of the British Empire, several reached Belgium and Holland and one has been returned from Warsaw, Poland, and another from Sweden.

* * *

MAJOR W. NEILL, D.S.O., prior to taking up an appointment in Malaya with the Colonial Service, recently learnt to fly at the South Coast Flying Club. Since he had only 36 hours at his disposal an intensive course was given by Mr. C. L. Pashley, the C.F.I., and in spite of poor weather 5¼ hours' dual was given between a Saturday afternoon and Sunday midday; on the Sunday afternoon Maj. Neill completed a successful solo. Another case of rapid instruction was recently given at Roborough Airfield by the Plymouth Club, who brought Mr. R. Trethewey from a state of never having been in the air to his first solo in four days.

SIAMESE GEMINI: The well known racing driver "B. Bira" recently flew to Goodwood to practice for the motor-race meeting. After surveying the circuit from the air he landed, completed several laps on the track and then took off again.

COLD WEATHER OPERATION OF AIRCRAFT

Survey of Operating Conditions, Shortcomings and Requirements in Sub-Zero Temperatures

ON Thursday, October 21st, a lecture under the above title was delivered before the Royal Aeronautical Society. Co-authors were Mr. G. W. Wilson, A.F.R.Ae.S., M.I.Ae.S., and S/L. E.P. Bridgland, R.C.A.F., A.E., B.Sc., A.F.I.Ae.S., A.F.R.Ae.S. Mr. Wilson is the senior official of the Ministry of Supply at the R.C.A.F. Winter Experimental Establishment, Edmonton, Alberta, whilst S/L. Bridgland is the Chief Engineering Officer at the Establishment.

TO understand how cold weather affects the functions of aircraft, necessitates a fund of knowledge as to what cold weather really is. Extreme low ground temperatures are usually associated with large areas of more or less flat country, far dispersed from large areas of exposed water, and temperatures of the order of −50 deg C are quite common. In addition, high winds are experienced, and although snowfalls are mostly of a moderate nature, drift snow can prevail for very long periods. Combined high wind with low temperatures not only produces blizzards and negative visibility, but also what is known as "wind chill." (Defined as the quantity of heat which the atmosphere is capable of absorbing within an hour from an exposed surface one metre square.) This is the worst form of cold weather to encounter as not only does it cause exhaustion, low morale, pain and frustration, but in some cases when the wind chill factor is unusually high, even saps the will to live.

It is generally thought that the fundamental difference between aircraft flying at altitude in temperatures around −40 deg C and aircraft taking-off from bases under sub-zero temperatures is the engine-starting problems connected with the latter. This is not strictly true and becomes evident when actual experience of both is acquired. In the first instance, the aircraft is not subjected to these low temperatures at altitudes for periods long enough for the whole structure and installation to become soaked and stabilized at the temperatures encountered, whereas taking-off, the aircraft begins the flight soaked at the prevailing outside air temperature and maintains that temperature when at altitude.

When parked under arctic winter conditions, aircraft are mostly in the open, hangars being few and far between, and the clearance of snow, ice and frost from the aircraft presents quite a problem. Properly fitting covers must be light in weight and moisture-repellent, and the fastening devices must also be easy to handle with heavily gloved hands. Blowing arctic snow finds its way into any small hole or crevice and seems to be more difficult to repel than desert sand.

Lubrication

The correct type of lubrication of aircraft plays an important part, especially in the functioning of controls. The use of a high melting point grease will adversely affect the frictional loads, especially on the larger types of aircraft. Experience has shown that for mechanical controls and races, grease to Specification D.T.D. 539 is very satisfactory.

Control Systems

The behaviour of the present type of controls employing cable with chain and cable push-pull rod systems is unsatisfactory, and the more so on large aircraft. On the larger types of machine, the trimmer controls become excessively slack and the main controls also develop slackness. This can be improved by the introduction of tensioning devices or, better still, by the incorporation of controls having the same coefficient of expansion as the bulk structure of the airframe.

Hydraulic Systems

The trouble connected with hydraulic systems under arctic conditions is usually on the ground when the aircraft has been dispersed overnight. Normally, the trouble is confined to leaking glands, although internal seals have been known to fail. Those systems employing natural rubber seals and glands give less trouble because these harden and stiffen at much lower temperatures than the synthetic types.

Non-metallic pipe-lines, if fitted on moving parts of the hydraulic system, frequently produce leaks at the end-fittings owing to loss of flexibility and subjection to deformation during operation. The present types of hydraulic pumps, however, give little or no trouble at low temperatures, whereas accumulators embodying air-cum-fluid chambers are often adversely affected.

Pneumatics

The pressure-maintaining capabilities of all aircraft pneumatic systems are generally poor when the aircraft is on the ground under low-temperature conditions. Systems embodying rubber sealing rings on the pipe-line unions give the more serious leakage. Moreover, loss of pressure takes place from the pneumatic rams fitted to the engine services, but this can be avoided by the incorporation of an isolating cock.

In spite of these serious leaks, once the aircraft becomes airborne, normal pressure is maintained in the system, which implies that the engine-driven compressors have ample capacity, and it is only when the aircraft has been dispersed long enough for the system to get soaked at the prevailing low O.A.T.s that the loss materializes.

Electrical Systems and Components

As is well known, batteries lose their capacity according to the degree of low temperature to which they are exposed, and also cannot be charged at the normal rate; therefore, if they cannot be maintained in heated conditions, they should be kept fully charged at all times.

Recent tests on alkaline accumulators (24 and 2 volt) indicate that they withstand temperatures down to −30 deg C to a greater extent than the lead-acid type, and also require less servicing. The synthetic insulating material used on the cables is affected greatly by hardening and becomes very brittle at low temperatures. Any form of handling or adjustment requires the application of heat to the cable, otherwise the material will crack and even break off in large pieces leaving the bare wires exposed. This is particularly so on aircraft equipped with folding wings.

Owing to greater friction, repeated engine starting, and the higher torque loads caused by engine stiffness, the life of starter motors is shortened somewhat, not necessary electrically, but more usually by mechanical defects, such as shearing of the teeth of the gearing.

Finally, it is important to have the ground flight switch situated away from the slipstream, as the operator is in danger of being frozen when the engines start up.

Instruments

Most instruments appear to operate almost as well at low temperatures as they do under temperate conditions, although engine-oil pressure gauges, compasses, clocks and watches are exceptions. Liquid-type compasses produce bubbles in the fluid, often to such degree that the application of heat will not remove them, and at temperatures below zero Centigrade, clocks and watches start to show signs of inaccuracy.

Undercarriages

Oleo shock struts operate in the main reasonably satisfactorily whether using a mineral- or castor-base fluid. For cold-weather operation, it is essential to reduce the duplication of stores and spares, etc., and all aircraft should be standardized and operated on one type of fluid and seals. A mineral-base fluid is the more preferable, since, in an emergency away from supply points, it can be made up from engine lubricating oil and kerosene.

It has been found that during engine running on the ground, minute particles of ice get impinged on the oleo struts and eventually find their way inside the lower seals, thereby destroying the sealing properties. To avoid this, gaiters or

Cold Weather Operation of Aircraft . . . . .

scraper rings need to be fitted round the telescopic tubes, preference being given to gaiters.

Synthetic tyres behave reasonably well at low temperatures, although flat spots develop when the aircraft has been stationary for several hours. Treaded tyres are far superior to the smooth type for maintaining grip on snow-packed surfaces. Ice-grip tyres show a slight improvement over the treaded type when used on icy surfaces.

Cabin and Cockpit Heating

From experience gained on different types of aircraft, the crew stations, or cabin temperatures, should be limited to minima of 0 to −5 deg C, particularly in fighter aircraft where the crew cannot divest themselves of any clothing whilst in flight. The exception to this is the navigator. This member of the crew needs to work his instruments with bare hands and some form of additional heat is necessary. Further, the navigator's table requires surface heating. Limited tests have been conducted using electro-thermal heating for this, and have shown promising results.

The main problem concerned with inadequate heating of cockpits and cabins is chiefly at the beginning of the flight. It is found that excessive misting and frosting of windshields, canopies and similar items takes place through the formation of condensate soon after the crew enter the aircraft. A hot-air spray is therefore required which can be directed on to the affected parts, but would not have to rely on ram effect for supply.

Engine Operation

THE second part of the lecture was devoted to considerations of engine operation, the first item to be dealt with under this heading being lubrication systems. Normally, aircraft engines are designed to operate primarily on a 100-second viscosity lubricating oil. Under arctic conditions they do so satisfactorily when dilution is used, but many problems arise from the oil system installations, and these are, in fact, the greatest single cause of aircraft and engine unserviceability.

Experience has shown that the standard type of oil tank does not usually incorporate a hot-well of adequate size to maintain an ample amount of diluted oil, and to keep it segregated from the make-up oil supply in the tank. Unless there is proper segregation, undiluted oil finds its way into the oil inlet, causing cavitation with possible starvation when the engine is started.

Oil-tank shapes vary with each type of aircraft, and the shape of a tank has some bearing on the warm-up rate of the make-up oil, it having been proved that a tank with a narrow cross-section, where the make-up oil does not extend a large distance from the hot-well, warms up more rapidly than one with a larger cross-section. Advantage, too, should be taken to run the oil return inlet pipe in such a manner internally that the heat from the return oil assists the warming-up rate. With most present types of oil tanks, the warming-up rate is very slow indeed.

Oil tank drain fittings are a source of great inconvenience. They should be easily accessible and the drain holes should be large enough to permit rapid draining. The filler, too, needs to be of ample size and diameter. This is particularly necessary if an aircraft has to be replenished with oil from drums. Additionally, the cap should be designed to permit a simple locking and unlocking operation, bearing in mind that the operator will have to wear heavy gloves. Locking wire as a safety measure should be avoided.

The layout and run of most oil-tank and engine vent-pipes produce breakdowns because of the trapping of condensate which freezes and blocks up the pipe-lines, causing high pressures which bulge and split the tanks.

Oil coolers, unless fitted with pressure relief valves to take care of sudden surge, fail with unceasing regularity. This type of valve is, in fact, an essential requirement, even when the oil is diluted. Thermostatic by-pass valves are an advantage in that they give a closer control of oil temperatures over a wide range of conditions and also prevent by-passing through over-cooling.

Even with extensive use of dilution, oil consumptions, both on liquid- and air-cooled engines, are practically the same as when used under temperate conditions. Although oil dilution has many advantages it does accentuate the aeration already present in the oil system, which builds up in large quantities of emulsified oil, both in the crankcase and tank, and normally shows its presence by venting oil from the breather when the engine is near, or at, full power. The intensity of the venting is associated with the quantity of diluent in the system and can be brought under control only by reducing power. This venting is particularly noticeable on in-line engines and, although various types of de-aerators have been designed, the most successful method so far encountered is that where the crankcase vent is connected to the forward ends of the camshaft covers, and the vapour is released from the covers at the rear into a common pipe to atmosphere. The motion of the valves and springs, etc., appears to break up the emulsified oil, which drains back to the sump by way of the camshaft drive casings.

There are some who deprecate any form of oil dilution on the assumption that the engine life is reduced, their argument being: first, that at low viscosity the oil has inadequate lubricating properties and finds its way to the bearings; secondly, that the diluent washes the accumulated sludge and carbon deposits into the restricted oil-ways, and, thirdly, when this deposit does find its way to the filters, they become choked. The lecturer went on to say that, after a number of years' joint experience, he and his co-author had yet to encounter this and, in fact, their experience has shown that the engine is left remarkably clean and the overhaul period is lengthened. In fact, one well-known airline in North America adopts dilution procedure the whole year round for this reason.

Cold Starting

The requirement for starting reciprocating engines cold under winter conditions raises two major problems, (a) provision for obtaining adequate cranking speed, and (b) supplying vaporized fuel to the engine in order that combustion will readily take place.

The supply of electric power for engine starting presents a problem at low temperatures because of the reduced accumulator capacity. Although a determination of the minimum cranking speed at which starts can be obtained is difficult, tests have indicated that 25 r.p.m. is the minimum at which starts are normally accomplished.

The next and most important factor in starting piston engines at low temperatures is the priming. A satisfactory priming system must (a) vaporise the priming fuel sufficiently so that combustion will readily take place, and (b) supply sufficient fuel to the cylinders after the initial firing to allow the engine to pick up and run smoothly on its main fuel system.

Many types of priming jets are available, but the type that has proved most satisfactory is that developed by the R.A.E. and used extensively on Rolls-Royce engines. Two of the more important factors are the configuration of the induction system and the location of the priming jets in that both of these have a great effect on the efficiency of the priming system.

Briefly, the present status is that in-line engines can be started consistently down to −35 deg C with 100-octane fuel although, on occasion, they have been started as low as −50 deg C. Radial engines have not been as satisfactory and it is considered that more development work is necessary on the priming systems before they can be considered satisfactory for arctic operation.

Gas-turbine engines are much easier to start at low temperatures. This is attributed to the following factors: (a) The lubricants used are less viscous than those for reciprocating engines. (b) There are fewer moving parts and, consequently, much less engine friction. (c) The initial rate of light-up is less critical because of the continuous combustion. Experience with the Derwent and Goblin engines has proved very satisfactory, both engines starting readily below −45 deg C.

Induction Systems

Low outside air temperatures have little effect on the functioning of induction systems, although aircraft fitted with intercoolers have been found to give low charge-temperature ratings at low O.A.T.s with consequent rough running. The introduction of a Thrustat oil control valve into the intercooler system operating at 55 deg C and fully open at 75 deg C has produced satisfactory engine operation.

A few isolated tests have indicated that improved fuel consumptions may be obtained by the use of hot air during flight. As this was noticed on aircraft fitted with intercoolers which maintained a constant charge temperature, it was attributed to the fact that the warm air gave better vaporization of the fuel in the carburettor. The decrease in fuel consumption

Cold Weather Operation of Aircraft . . . . .

noted was as high as to give a 10 per cent increase in A.M.P.G.

Fuel Systems

Normal fuel tanks have caused no trouble during winter operations, but integral tanks have a tendency to leak around the rivets at low temperatures, owing to expansion and contraction of the tanks, which breaks up the sealing compound.

The most critical factor in the fuel system is the method of injecting fuel into the engine. The standard carburettor systems have operated satisfactorily, but the fuel-injection systems have not performed very well at low temperatures.

Cooling Systems

Both liquid- and air-cooled engines have proved satisfactory. On some occasions it has been necessary to fit blanks to the radiator or baffles to the cylinders to maintain operating temperatures. A coolant mixture of 60 per cent glycol and 40 per cent water is used in the coolant systems and slushing of this mixture has not been experienced.

Engine Auxiliaries

The greatest problem with auxiliaries is proper lubrication. Where they are lubricated indirectly by engine oil, there is a danger of oil congealing in the units while the engine is stopped, causing failure of the drive when starting again. In some cases, this has been remedied by introducing dilution to the auxiliary.

Airscrews

No serious difficulties have been encountered in normal airscrew operation. The main problems have been associated with operation of the feathering system. Most systems are at present fitted with a bleed which allows a small quantity of engine oil to circulate through the feathering system to warm up the oil in the feathering line, and to prevent the oil in the lines from congealing during flight. It is essential that the feathering lines be kept as short as possible.

Wooden or synthetic blades in metal adaptors are greatly affected when used in areas of extreme low temperature. Because of the differential expansion, the blades become dangerously loose at the root, and the application of heat prior to flight acts only as a palliative.

Maintenance

The third section of the lecture was devoted to maintenance, the authors giving recommendations of practice under the various heads previously dealt with. One of the more important observations made was concerned with ground handling equipment.

Under normal operating conditions, it was given as the lecturers' opinion that ground handling equipment is invariably treated as of secondary importance, consideration often being given to improvization. Under arctic conditions, it has been found that suitable ground equipment is of paramount importance, insofar that, without it, aircraft of any number cannot operate on an organized basis.

In conclusion, the lecturers suggested that from their remarks it might be construed that equipped bases with heated hangars and the like would have to be an essential requirement to operate large fleets of aircraft successfully. The provision of such is impracticable, but it was suggested that a material aid to this end might be accomplished by supporting squadrons with "parent aircraft."

These were envisaged as incorporating an auxiliary power unit of sufficient capacity to operate a heater unit of some 400,000 B.T.U.; A.C. and D.C. generator sets; compressor; and hydraulic pump. In addition to providing these servicing components, they could also act as radio and navigational stations. Further, a small repair workshop and medical station could also be installed. If the aircraft chosen for this type of duty were not large enough to accommodate these services, a glider could be used in conjunction with them, equipped, for instance, as the radio and navigational station.

The authors further gave it as their opinion that the helicopter would also serve an important rôle in arctic operations. Apart from rescue work and observation duties, it would be valuable for surveying frozen lakes and potential advanced bases. However, experience on the functioning of this type of aircraft under low temperatures has yet to be obtained.

FOKKER TODAY (Concluded from page 515)

operational, the S.14 is a jet-powered 2/3-seater. Instructor's and first pupil's seats are arranged side by side well forward in the nose, and a Rolls-Royce Derwent mounted above the wing centre section exhausts through a long, straight jet pipe. The air duct divides immediately behind the nose intake, the two sections passing on each side of the cockpit and into the plenum chamber amidships. Production of a prototype will commence as soon as possible. The artist's impression of the S.14 shows it to be sleek and attractive.

There are three other post-war Fokker designs which may be mentioned. The P.1 Partner, similar in layout to the Promotor but very much smaller, is a particularly attractive design for a small two-seater. The engine is to be an 85 h.p. Continental pusher. The method of entry and exit, the subject of a patent, is most unconventional, being somewhat reminiscent of the opening of an American car bonnet. The whole nose of the Partner on the release of catches lifts up and forward on hinged links, enabling the pilot and passenger to step out to the sides. Unfortunately, other commitments have necessitated the shelving of this design for the time being.

Another very interesting design for which plans have temporarily been shelved is that of the F.26 Phantome, a model of which was shown at the 1946 Paris Show. It was to be a 17-seater, high-speed, pressurized, medium transport powered with two Rolls-Royce Nenes mounted close together beneath the fuselage.

Finally, a completely new design is at present being developed, but beyond the fact that it is a Freighter for K.L.M. consideration, no information can be released.

Already the Promotor has made a short demonstration visit to this country, and during the next few weeks we may expect to see an example of the S.11 Instructor over here. This will be studied with the greatest interest by both Service and civil authorities, although from the point of view of purchase, it is perhaps unfortunate that an American engine, representing dollar outlay, is fitted. The possibility of fitting the new Cirrus Bombardier might be examined, the Gipsy Six being a little on the large side.

Not only are the interests of this country bound up with those of Holland in the Western European Union, but both countries also have similar Far Eastern problems. Close co-operation and support for the proposals regarding standardization of equipment are likely to be of the greatest mutual benefit.

BOOK REVIEW

Laboratory of the Air

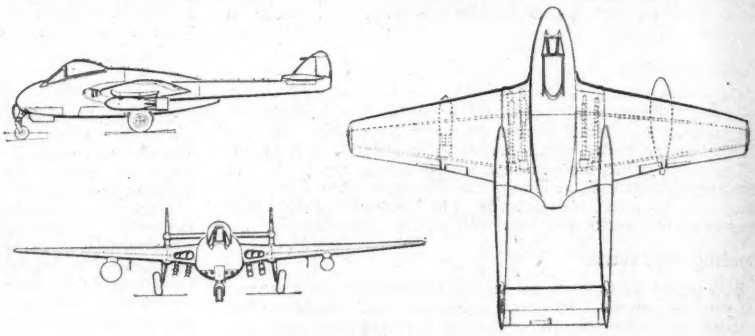
THE way of an eagle in the air; the way of a serpent upon a rock; the way of a ship in the midst of the sea; and the way of a man with a maid—these were things too wonderful for the sage who wrote them in the Book of Proverbs; but consider what Mr. John Pudney has to say of them in *Laboratory of the Air*—an account of the Royal Aircraft Establishment of the Ministry of Supply (His Majesty's Stationery Office, 3s 6d net):

"The last of these," observes Mr. Pudney, "has been the universal problem of mankind down the ages; and the third has concerned our island story through the centuries; understanding of the first has been the purpose behind the endeavour of the Royal Aircraft Establishment during the last decade." His account of the R.A.E. is full of romance, and he has drawn freely on an abundance of anecdotes. The story of the gyro gunsight, one of the R.A.E.'s most significant products, occupies several pages. Navigational instruments, balloons, air photography, gas turbines, aerodynamics, structures, radio, carrier-borne aircraft, ditching, magnetic mines, fire extinction, oxygen gear and automatic pilots, all have their place in the book, and the contribution of Farnborough to the winning of two wars is duly recorded.

The photographs—many of them published for the first time—are worthy of the text.

GROUND-ATTACK VAMPIRES

Features of the Marks 5, 6 and 50: 548 m.p.h. with Goblin 3 : A 2,000-lb. Bomb Load



ON page 518 of this issue there appears an unusual photographic study of a de Havilland Vampire F.B. Mk 5 ground-attack fighter, as now being supplied to the R.A.F. Generally similar are the Marks 6 and 50, the former, with Goblin 3 turbojet in place of Goblin 2, for Switzerland, and the latter, likewise with Goblin 3, for Sweden. Due to their greater thrust (3,300 lb instead of 3,000 lb) the "export" machines have a superior performance, the top speed being 548 m.p.h. Rate of climb at sea level is 4,800 ft/min, time of climb to 10,000 ft, 2½ min, and take-off to a height of (50 ft at 12,350 lb), 1,130 yds.

Basically similar to the Vampire 3, the new marks have modifications to fit them for operation in the ground-attack fighter role, the most noticeable of which is the "clipped" wing. The top wing-skin is strengthened, and provision is made for external bombs and rocket projectiles under the outer and inner mainplanes respectively. Fittings for the R.P.s and bombs are removable.

To facilitate production, the following features of the Sea Vampire 20 are standardized: (a) modified wing structure, (b) strengthened long-stroke main undercarriage; (c) special protective treatment and synthetic paint scheme, (d) extra supports for main fuel tank.

The "built-in" armament of four 20 mm British-Hispano guns, with 150 r.p.g., is retained, and the following external loads may be taken:—

(a) 8 x 60 lb R.P.
(b) 2 x 500 lb bombs, or
2 x 100-gal fuel tanks.
(c) 2 x 1,000 lb bombs (alternative to [a] and [b]).

Fitted with high-pressure tyres, the new Vampires are cleared for operation from normal airfields and runways. A modification to introduce low-pressure tyres will permit operation from rough surfaces.

DE HAVILLAND VAMPIRE 5
One D.H. Goblin 2 of 3,000 lb. Static Thrust

DIMENSIONS	
Span	38ft
Length	30ft 9in
Height	6ft 2in
WEIGHTS	
Weight empty	7,253 lb
Normal flying weight	10,520 lb
All-up weight with 2 x 500 lb bombs and 8 x 60 lb R.P.'s	12,360 lb
TANKAGE	
Main tank	96 gall
Inner wing tanks	106 gall
Outer wing tanks	128 gall
Wing drop tanks	200 gall
PERFORMANCE	
Max. speed at 3,000—8,000ft	532 m.p.h.
Max. speed at 15,000ft	527 m.p.h.
Rate of climb at sea level	4,050ft per min
Rate of climb at 10,000ft	3,000ft per min
Rate of climb at 25,000ft	1,850ft per min
Time of climb to 10,000ft	3 min 10 sec
Time of climb to 20,000ft	7 min 10 sec
Patrol duration* at sea level at 220 m.p.h. with drop tanks	2 hrs
Patrol duration at 30,000ft at 350 m.p.h. with drop tanks	2 hrs 35 min
Still air range† at sea level at 350 m.p.h. with drop tanks	590 miles
Still air range at 30,000ft at 350 m.p.h.	1,145 miles
Take-off distance to 50ft at all-up weight	1,210yd.
Landing distance from 50ft at 8,500 lb	1,100 yd

** Allowance made for fuel used in take-off, climb and ½hr. combat.*
† Allowance made for fuel used in take-off, climb, and descent, the distance covered on climb and descent being included.

ULTRA-LIGHT JET

ENGINEERING students at the Cal-Aero Technical Institute, California, are constructing a jet-powered, single-seat light aircraft. Although the design was originally laid down as a "class project," the Cal-Aero director, E. G. Nicholson, feels there may be potential applications for the aircraft, either as a target "drone" or a personal machine.

Features of the design include a butterfly tail, and "bicycle-type" retractable undercarriage—with two main wheels placed in tandem in the fuselage, and twin outrigged wheels in the wings for balance. Dimensions are small—20ft 10in span, and a length of 17ft 1in. The air intakes for the jet unit, which is also a student design with construction mainly of surplus piston-engine parts, are below the leading-edge.

OUTSIZE RATOG

THE 180,000-lb Lockheed Constitution transport of the U.S. Navy has lately been the subject of tests with six assisted-take-off rockets to supplement the power of its four Pratt and Whitney Wasp Major piston engines. The rocket power approximated to that of a single Wasp Major. Tests were made at various gross weights, the units being fired by the pilot as soon as the aircraft "unstuck" and the undercarriage began to retract. Three rocket "bottles" were stowed in compartments within the wing on each side of the fuselage behind the inboard engine and above the flaps. Reaction lasted about 15 seconds, and the smoke trail, passing well under the tailplane, caused no buffeting.

Lockheed technicians have pointed out that the standardization of A.T.O. rockets on large transports would provide an extra measure of safety in case of sudden power failure; not only would they be valuable in an emergency, but they would assist take-off on hot days from small airfields or with abnormally large loads.

Two Constitutions have been built by Lockheed for the U.S. Navy, and both are undergoing final flight testing prior to acceptance. A total of 180 passengers an be carried on the two decks and the crew numbers twelve. A commercial version, with a crew of eleven and 128 passengers, is foreseen, the power plants being four turboprops, each delivering about 5,000 s.h.p. This version would have a cruising speed of about 350 m.p.h., and attain 400 m.p.h. with the turboprops at full throttle.

ASSOCIATED ILIFFE TECHNICAL BOOKS

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GAS TURBINES AND JET PROPULSION FOR AIRCRAFT by G. Geoffrey Smith, M.B.E., 4th edition, 3rd impression — 12s. 6d. (By post 13s.)

WALL DIAGRAMS: Rolls-Royce Derwent / De Havilland Goblin II / Metrovick F/3 Gas Turbine — 4s. each (By post 4s. 4d. each)

TURBINES FOR AIRCRAFT (4-page colour leaflet reprinted from "Flight") — 6d. (By post 7½d.)

THE COMPLETE AMATEUR PHOTOGRAPHER by Dick Boer. Edited by A. L. M. Sowerby, B.A., M.Sc., A.R.P.S. — 21s. 0d. (By post 21s. 8d.)

PHOTOGRAPHIC SKIES David Charles, F.R.P.S. — 5s. (By post 5s. 3d.)

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CORRESPONDENCE

The Editor does not hold himself responsible for the views expressed by correspondents. The names and addresses of the writers, not necessarily for publication, must in all cases accompany letters.

ALTITUDE SEPARATION

Have Standards of Instrument Flying Deteriorated ?

I REFER to recent correspondence in *Flight* on the subject of altitude separation between aircraft. Your correspondent (October 14th) referred to Northolt Airport, where I understand a provision is made that all aircraft using the airport must be able to make use of the Standard Beam Approach installation.

During four years of association with S.B.A. training I have never come across any instance where the safety of separating aircraft vertically by 500ft was ever in doubt, assuming, of course, that an average standard of instrument flying had been reached by the pilots concerned.

Standard Beam Approach is the highest form of instrument-flying training available, and with the end of the war and the closing down of the majority of S.B.A. schools, it appears that facts proven by years of experience have been forgotten.

The decision to separate aircraft vertically by 1,000ft when over an airfield no doubt shows a commendable desire for maximum safety, but it all gives rise to the disquieting inference that the standards of instrument flying have declined.

Your correspondent appeared to be appalled by the thought of 500ft separation. As a pilot of average instrument-flying ability, I, too, am appalled—by the reduced standard of instrument-flying efficiency which this implies.

I am sure that all instrument-flying enthusiasts will agree when I suggest that your correspondent's apprehensions as to the effects of turbulence—and hot chestnuts—on instrument flying were rather over-rated. "S.B.A. ENTHUSIAST."

Hillingdon, Middx.

"GIANTISM"

How Big is Too Big ?

IN his letter in *Flight*, October 7th, Mr. S. M. Udale makes the statement that Cunard-White Star will never again build big ships like the *Queen Mary* and *Queen Elizabeth*, because "from a business point of view they are 50 per cent too big." Whether your correspondent has any connection with Cunard-White Star and thus quotes official views, I have, of course, no means of knowing; but whatever the pre-war return from operation of the *Queen Mary* may have been (the *Queen Elizabeth* was, of course, not then in use) now, at all events, these two ships are earning an enormous amount of hard currency for this country, and there is no reason to doubt that, if the Line had two more *Queens* of the same size, they (and the Exchequer) would be highly pleased.

White's "elephant" which, I believe, is the cynical epithet given to the Empire State Building, may certainly be too big but surely not "50 per cent too big from every point of view." After all, the Woolworth and Chrysler Buildings and Radio City are not unsuccessful, and they are well over half the size of the Empire State Building.

It is my personal opinion that the wrong emphasis is used when evaluating such large aircraft as the Brabazon I and the SR/45 boat. The common view is that these aircraft may well prove to be too large for economic operation. That view may well be correct. It does not, however, alter the fact that the only way in which experience can be gained of very large aircraft is to build them and fly them. It is, of course, the experience that is the vital quality.

In an article describing the Brabazon I, *Flight* stated that it grew from a bomber design study. One should not lose sight of that very pertinent genesis.

Despite supersonic types, guided missiles, the atom bomb, etc., etc., he would be a rash man who would categorically state that aircraft with the speed, range and payload performance of the Brabazon and Saro boat types would not be necessary for *military* purposes in the future.

The Brabazon is fairly or unfairly, accordingly as to whether one is an economist or not, being debited with the constructional costs of the airfield and hangers at Filton. The current estimated cost has been given as £12,000,000—certainly a considerable sum of money; but evaluated as the cost of factual know-how in a possibly vital branch of aeronautical progress, not perhaps so extravagant an amount as may appear at first sight.

Again, there is no real shortage of money within this country: the pinch comes only where dollar exchange is involved, and it is, of course, not involved in this instance. Furthermore, we are now suffering, so far as commercial aviation is concerned, from the effects of the agreed war-time policy of leaving almost solely to our American allies the development of aircraft with a commercial application. I think it would be not only foolish, but perhaps even dangerous, for us to follow a similar procedure with regard to very large aircraft, as would be the case if we concentrated on fighters and left large bombers to the Americans. What it really boils down to is that we simply cannot afford not to develop very large aircraft of our own and, by these standards, the price paid for evolving the Brabazon I and the SR/45 is, surely not excessive.

Shirley, Surrey. HILERY STANHOPE.

FLYING BOATS

Needed on Many Empire Routes

HAVING unfortunately missed the issue of *Flight* of September 2nd I have only just seen Mr. Geoffrey Dorman's letter advocating a separate marine aircraft corporation. This is an arrangement I have long favoured in private without having had the courage to shout it from the hangartops, as I should have liked to do.

The suggestion comes at a most opportune moment when everybody is interested in Commonwealth co-operation and defence. Here is a golden opportunity to create a common organization with our friends in Australia and elsewhere who are not dazzled by the undoubted virtues of the Constellation.

Many inter-Commonwealth routes cry out for flying boats. There is notably the strategic all-British route from England to Western Australia which is shorter, arrives at the logical side of the Continent and is admirably suited for express traffic. The route from Australia to Canada is another, and there is renewed interest in a more direct connection between Australia and South Africa. This would best be provided by a feeder to the main line at, say, Diego Garcia, since an aircraft large enough to make the crossing direct from Perth to Mauritius would not be justified.

There are economic as well as political reasons why the Government should support such a plan. Somewhere around £10,000,000 has been invested in the SR/45 project. There is no hope of recovering such a sum unless a reasonable number of the aircraft are built and used. Moreover, there is no machine anyhere in prospect so suited to these routes, as well as those already planned by B.S.A.A.

Let the Sandringhams, Solents, and Saros be handed over to people who can see and exploit the virtues of the characteristically British flying boat and who will make profits by offering the public a standard of travel that no other country can hope to equal. CHRISTOPHER BLACKBURN.

Finchley, London, N.3.

FORTHCOMING EVENTS

Oct. 28th.—R.Ae.S. "Aircraft Engineering and Production," by a member of the Handley Page staff

Oct. 29th.—R.Ae.S. Conversazione, Science Museum, South Kensington.

Oct. 30th.—S.L.A.E. (South Eastern Area): "High Speed Flight," by W. A. Waterton, Mansion House, 26, Portland Place, London, W.1, at 3 p.m.

Nov. 1st.—R.Ae.S. (Derby): "Fighter Aircraft of the World," Sqn. Ldr. H. F. King, M.B.E.

Nov. 4th.—Sir John Cass Technical Institute: "The Aero Gas Turbine," W. Tipler M.A.

Nov. 10th.—R.Ae.S. (Graduates and Students): "Flying Experiences," Lt. Cdr. (A) E. M. Brown, O.B.E., D.S.C., A.F.C., M.A., A.R.Ae.S., R.N.

Nov. 12th.—Redditch Society: "Aircraft Photography," John Yoxall.

Nov. 15th.—Association of Auto-electrical Technicians: "The Electrical Starting of Aero Gas Turbine Engines," C. H. Barby, M.A.E.T.

Nov. 17th.—R.Ae.S. (Weybridge): "Some Aspects of Practical Flying," J. K. Quill, O.B.E., A.F.C.

Nov. 17th.—R.Ae.S. (Borough) "Civil Aviation," Peter G. Masefield, M.A., F.R.Ae.S.

Nov. 17th.—R.Ae.S. (Hatfield): "Design Problems of Large Flying Boats," H. Knowler, F.R.Ae.S.

Nov. 17th.—R.Ae.S. (Preston): "Investigation of Aircraft Accidents," A. Cdre. Vernon Brown, C.B., O.B.E., F.R.Ae.S.

Nov. 17th.—Royal United Service Institution: "Jet Aircraft and their Possibilities," Dr. S. G. Hooker.

Nov. 19th.—Institute of Navigation: "Magnetic Compass Problems—A Fresh Approach," Dr. G. N. Harvey, O.B.E.

Nov. 20th.—Joint Meeting Royal Aeronautical Society and Helicopter Association of Gt. Britain. Full day Discussion on Helicopters.

SERVICE AVIATION

NINE YEARS' SERVICE: Four Harvards of the Empire Flying School, Hullavington. The splendid work done since the first Harvards were delivered to the R.A.F. in 1939 will continue until replacement by advanced trainers of the Balliol-Athena type is effected.

Royal Air Force and Naval Aviation News and Announcements

R.A.F. Appointment

AIR VICE-MARSHAL S. D. MACDONALD, C.B.E., D.F.C., is to be Assistant Chief of Air Staff (Training) in succession to A.V-M. Sir Basil Embry, K.B.E., C.B., D.F.C., A.F.C., who is on leave pending a new appointment. Since April, 1946, A.V-M. Macdonald has been A.O.C. No. 11 Group, Fighter Command; he had previously served with No. 12 Group as S.A.S.O. since September, 1944.

Progress at Panshanger

SINCE No. 1 Reserve Flying School of the R.A.F.V.R., based at Panshanger, Herts, began training nagivators and signallers on April 25th this year over 400 hours' air instruction of aircrews in this category (including 100 hours' night flying) have been completed. We record this not only as an appreciation of the excellent efforts of No. 1 R.F.S., but in correction of a previous statement (*Flight*, October 14th, p. 473) to the effect that V.R. navigator-signaller training did not begin until October 1st.

No. 1 R.F.S. now has on its strength the greatest number of reserve pilots, with a total of 335 R.A.F.V.R. and R.A.F.O. pilots, and twelve W.A.A.F.-V.R. Since post-war V.R. pilot training began at Panshanger in June, 1947, 13,000 hours have been logged with 250 hours' night flying in the last four months.

The School began life more than a quarter of a century ago as the de Havilland Flying School, and it has been operated by D.H.s ever since. During the war it was known as No. 1. E.F.T.S. and was commanded throughout by the present C.O., W/C. C. A. Pike, A.F.C.

Cambridge "At Home"

HEAVY rain during the afternoon of Saturday, October 16th, failed to prevent a large crowd from watching the annual competitions between the University Air Squadron and 22 Reserve Flying School, at Cambridge Airport. 22 R.F.S. won all three events this year, with a bare victory in the formation flying contest, and decisive scoring in the aerial treasure hunt and spot landing event. For the entertainment of visitors and support of the reserve recruiting drive there were also displays of parachute jumping by R.A.F. instructors from Upper Heyford, and gliding by the A.T.C.; the Territorial Army's local units exhibited some of their heavy equipment. F/L. Roberts, of 66 Squadron, defied the low cloud base by bringing a Meteor 4 from nearby Duxford for some high and low-speed fly-pasts.

Cranwell to West Point

THE Commandant of the R.A.F. Cadet College, Cranwell, A. Cdre. R. L. R. Atcherley, C.B.E., A.F.C., and Mr. P. Johnson, O.B.E., the Director of Studies, are making a tour of the U.S.A. and Canada to study the methods of training at institutions parallel with the R.A.F. College. From to-day (October 28th) until October 30th, they have been invited to visit the United States Military Academy at West Point, New York, at the invitation of the Superintendent, Maj. Gen. M. D. Taylor. Later they will go on to Vancouver to see the R.C.A.F. Cadet College.

In the Lord Mayor's Show

THE Royal Auxiliary Air Force, the R.A.F.V.R., and the R.O.C. will take a prominent part in this year's Lord Mayor's Show since the auxiliary forces of the Crown will be the theme of the procession. Two floats will depict auxiliary airmen in civilian occupations and week-end training, and another will display badges of the 20 R.Aux.A.F. flying squadrons with their wartime battle honours. A typist will be shown in city office and Fighter Control Unit background; on the fifth float badges and recruiting posters for the R.A.F. and W.A.A.F. Volunteer Reserves will be featured, and on the R.O.C. float members will show the contrast between everyday and week-end activities. Also in the Show will be marching detachments of the auxiliary bodies and the bands of the Halton Apprentices, and W.A.A.F., and a London A.T.C. band.

Auxiliary Appointments

SQUADRON LEADER R. P. BEAMONT, D.S.O., D.F.C., has been appointed Commanding Officer of No. 611 (West Lancashire) auxiliary flying squadron. S/L. Beaumont joined the R.Aux.A.F. in June, 1947, when he returned to 609 (West Riding) Squadron, which he had commanded during the war. In 1944 S/L. Beaumont led the Tempest wing responsible for destroying more than 600 flying bombs; he was taken prisoner in September that year. Since leaving the Service, he has been engaged in test-flying, and is at present chief test pilot of the English Electric Company's aircraft division.

Squadron Leader R. P. Beamont.

S/L. R. C. T. Goodwin is to command No. 605 (County of Warwick) Squadron, in succession to S/L. Walker, who is taking up a permanent commission in the R.A.F.

W/C. R. D. George, O.B.E., D.S.O., is to command No. 3619 (County of Suffolk) Fighter Control Unit, R.Aux.A.F., stationed at the Municipal Airport, Ipswich.

The V-1 and V-2 Battle

ALTHOUGH more than three and a half years have passed since the last of over 10,000 flying bombs and rockets were launched against this country by the Germans, Air Chief Marshal Sir Roderic Hill's newly-published report on the campaign against the V-weapons* makes interesting and informative reading. Sir Roderic commanded Air Defence of Great Britain from the date of its inception, November 15th, 1943, until its former title of Fighter Command was restored on October 15th, 1944. He remained as A.O.C. Fighter Command until the end of the war in Europe.

Six months before the first flying bomb fell near Gravesend in the early hours of June 13th, 1944, Sir Roderic Hill and General Sir Frederick Pile, the officer commanding A.A. Command, had jointly completed a plan of defence against the attacks by pilotless aircraft then known to be in advanced stages of preparation. The beginning of the attacks found the defences well prepared and deployment of the guns and balloons was completed according to plan in a surprisingly short time. Problems quickly arose—the old difficulty of preventing interference between A.A. guns and fighters was finally settled by establishing rigid gun-belts, and prohibiting fighters from entering under any conditions. The fighter aircraft available were not capable of giving their best performances at 2-3,000 feet—the height at which the bombs flew. Modifications were made to the engines of our aircraft to enable 150-octane fuel to be used, with correspondingly higher boost pressures, and a wing of Mustang 3s, which were very fast at the operational altitude, was borrowed from the 2nd T.A.F. Orders were given that all fighters operating exclusively against flying bombs were to be stripped of paint, armour and unnecessary external fittings, and outer surfaces were to be polished; speed increases of as much as 30 m.p.h. were gained with some aircraft. The speed advantage of the Spitfire 9 and 14, and Tempest 5, was, says Sir Roderic, only fractional. Very close control of fighters was necessary to provide successful interception. Although the majority of pilots preferred shooting down enemy aircraft over France, attacking the V-1s was not without risk, a fact grimly illustrated by the death of five pilots and one navigator through exploding the missiles in the air at a range closer than 200 yards. One feature of the operations, perhaps previously unknown to pilots taking part, is related in the report—"In order that our pilots should not lose their lives by colliding with the barrage we perpetrated a pious fraud on them by allowing them to believe that the balloons would fly continuously."

A.Cdre. G. H. Ambler, C.B.E., A.F.C., Deputy Senior Air Staff Officer to Sir Roderic Hill, suggested on July 13th the plan of moving the A.A. guns from the folds in the North Downs, where they had been located from the beginning of the operation in order to minimize possible jamming of their radar, to the coast, where "proximity fuses" could be used without danger to inland property, and the gunners would have a clearer view of their targets. Time was vital, and after consulting Sir Robert Watson-Watt, the radar expert, General Pile, and A.V-M. Saunders, the A.O.C. 11 Group, to ensure that the proposal was both technically and tactically sound, Sir Roderic personally ordered the re-deployment of the guns, which began on the same day. On July 17th all the heavy guns were in action on the coast and were joined by the light guns two days later. The move was soon followed by a notification from the Air Ministry that permission at a higher level should first have been obtained, and Sir Roderic "was left in no doubt that he would be held personally responsible for the outcome." The operational results, however, were excellent, and he records that "while flying over the South Coast on August 29th I could see over Romney Marsh a wall of black smoke marking the position of the barrage. From time to time a fresh salvo would be added to repair the slow erosion of the wind. On the far side of the barrage fighters were shooting down flying bombs into the Channel; on the nearer side more fighters waited on its fringe to pounce on the occasional bomb that got so far. The whole was as fine a spectacle of co-operation as any commander could wish to see."

Capture of the launching bases by Allied armies ended the main attack in September, and the later offensive with bombs air-launched from He IIIs, and missiles of longer range, from bases in Holland, was sporadic and less powerful. The operations to counter these desperate last measures, including the launching of A-4 (V-2) rockets from September 8th, 1944, until March 27th, 1945, are described fully in Sir Roderic's report.

*"*Air Operations by Air Defence of Great Britain and Fighter Command in Connection with the German Flying Bomb and Rocket Offensives, 1944-1945." A Report submitted to the Secretary of State for Air on April 17th, 1948, by Air Chief Marshal Sir Roderic Hill, K.C.B., M.C., A.F.C., published on October 20th as a Supplement to the London Gazette, obtainable from His Majesty's Stationery Office.*

OPPOSITE NUMBERS: General Rodrigues, Chief of Staff of the Portuguese Army, met Lord Tedder during his recent visit. R.A.F. Vampires were demonstrated for the General and his Staff at Odiham.

W.A.A.F. Commissions

WOMEN entering the W.A.A.F. on two- or three-year engagements may now be recommended for short service commissions of five years' active list service. Since the war ended only airwomen already serving on extended service engagements have been eligible for commissioning. Pending decisions on pay and conditions in the permanent women's service, airwomen who come under this scheme will receive gratuities of £50 for each year of commissioned service. Branches at present open for W.A.A.F. officers are catering, equipment, provost, administrative and secretarial, including intelligence, and the raid-reporting section of aircraft control.

R.A.F. Swimming Success

THE Singapore inter-Services 1948 swimming championships were held at the Singapore Swimming Club last month. The R.A.F. team won with a total of 74 points to the Army's 64 and the Navy's 63.

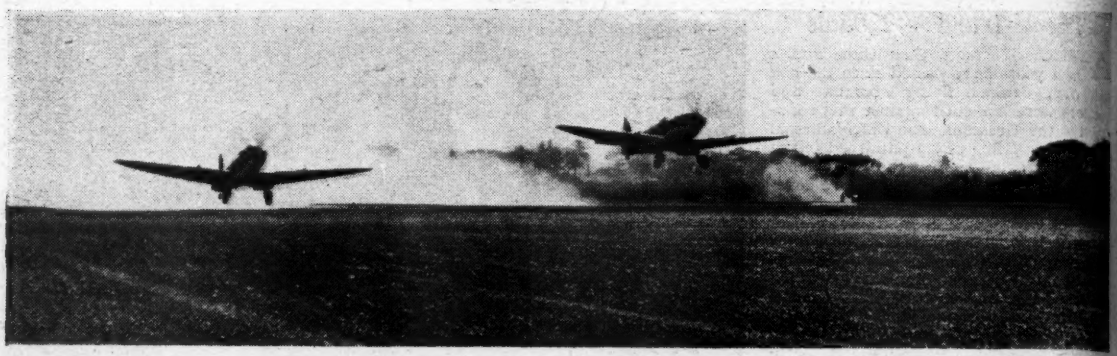
Paper Chase

THE Organization and Methods Division of the Air Ministry are to attempt to reduce the number of forms used by the R.A.F. Their intention is to eliminate unnecessary forms and reduce where possible the number of copies printed.

The Jolliffe Trophy

FOR seven years, the Jolliffe silver challenge trophy has been awarded annually to the R.A.F. Station judged to have the best dining hall. This year's winner is Scampton, of Bomber Command, a station now accommodating U.S.A.F. Superfortress squadron personnel as well as R.A.F. men. Airmen of both air forces mess together, and their cooks co-operate in the kitchen, where rations are pooled. The normal serviceman's attitude to his cooks was amusingly in evidence, when Americans made the coffee and British cooks brewed the tea. The immediate result was that the American airmen chose tea, while the British drank coffee!

Interesting ingenuity has brightened



TROUBLE FOR TERRORISTS : Spitfires take off from the R.A.F. airstrip at Kuala Lumpur for an attack on Communist hideouts.

Service Aviation . . . . .

the interior of the airmen's mess at Scampton—internal window boxes now decorate the dining hall, and there are landscape murals on the upper walls. Badges of squadrons based at Scampton are also displayed, with a station Roll of Honour, and list of wartime decorations awarded to station personnel. The Under-Secretary of State for Air, Mr. de Freitas, was due to present the trophy to the Station Commander yesterday, October 27th. Two Scottish stations, Kirknewton, of Maintenance Command, and Kinloss, Coastal Command, tied for second place.

Permanent Commissions

THE following officers have been selected for permanent commissions in the R.A.F. in the branches shown.

GENERAL DUTIES BRANCH

Wing Commanders: D. A. Garner, D.S.O., H. S Grimsey, D.F.C., A.F.C., A. N. Jones.

Squadron Leaders: P. A. Alt, F. E. Burton, O.B.E., D.F.C., I. H. Cosby, D.F.C., F. G. Daw, D.F.C., B. Drake, D.S.O., D.F.C., P. A. Dudeney, G. H. Duncan, N. B. Freeman, G. E. Goode, D.F.C., W. G. K. Gorne, D.F.C., M. C. C. Haycroft, D.F.C., G. R. G. Henderson, A.F.C., P. C. Joel, D.F.C., M. Kellett, D.F.C., H. B. Kirk, L. F. Kneil, D.F.M., A. D. Lambert, H. W. Lamond, A. McAdam, G. Marsland, H. J. D. Matson, A.F.C., E. B. Panter, D.S.O., D.F.C., J. L. Pepperman, H. N. Phillips, D.F.C., G. F. Reid, D.F.C., J. M. Ramsey, P. N. Smith, D.F.C., W. Stewart, C. W. S. Thomas, E. W. Tremlett D.F.C., L. M. Whetham, D.S.O., D.F.C., P. R. Woodward, D.F.C.

Flight Lieutenants: M. T. H. Adams, D.F.C., F. W. Alder, A.F.C., G. Allen, M.C., J. Atkinson, R. L. W. Baelz, D.F.C., J. D. Baker, C. J. Barrey, D.F.C., A.F.C., D.F.M., K. R. Bartholomew, H. Bennett, R. A. Bethell, G. Blakeman, B. A. Bourne, P. C. Bowry, N. R. L. Bristow, J. M. Briggs, J. G. Brodie, P. H. J. Buddery, M. R. Burroughs, D. J. Butters, D.F.C., W. D. Caldwell, J. M. Calvey, C. M. Cassels, J. Catley, J. W. Charman, V. G., Clarke, J. E. Close, J. E. Cockfield, A. Collins, D.F.M., C. I. Colquhoun, D.F.C., E. H. Coombs, S. F. Cooper, A.F.C., J. C. Cox, P L. Crossley, G. E. Davies, D.F.C., J. J. Deverill, J. I. S. Digman, D.F.C., J. Double, D.F.C., A. G. Douglass, D. H. Downs, P. G. Driver, A. T. Dugdale, D.F.C., A. P. Dunn, G. B. Dunning, D.F.C., F. R. Edmondson, D.F.C., V. R. L. Evans, D. I. Fairbairn, J. P. Ford, A.F.C., G. D. Fuller, G. H. W. Glenn, D.F.C., N. A. J. Griffin, J. D. Grubb, D.F.C., J. V. Hadland, D.F.C., B. R. Hall, D.F.C., A.F.C., W. Harbison, A. W. Harding, E. W. F. Hare, A. Harper, R. F. Harris, S. A. Harris, D.F.C., P. M. Harvey, R. H. Hastie, N. W. Heale, J. H. Hedger, F. M. Hegarty, R. B. Hesselyn, M.B.E., D.F.C., D.F.M., T. L. Higgins, E. M. Higson, A. D. Hindmarsh, K. H. Houghton, D.F.C., T. L. Hunt, R. P. James, G. J. Janes, R. E. Jaquest, J. F. D. Jarmy, D.F.C., F. A. Johnson, D.F.C., G. L. Johnson, D.F.M., J. H. Johnson, A. R. Jordan, D. W. Kingston, K. R. Lang, P. R. Lewell, E. G. Lewis, D. M. L. Lob, K. H. Lohan, J. A. W. Long, A. Lloyd, H. H. Lloyd, D.F.C., J. McCallum, N. K. McCallum, D.F.C., R. R. McGowan, A. G. McIntyre, D. H. T. McRae, D.F.C., M. M. Mair, D. R. Mallett, J. F. Manning, S. H. Martin, W. M. Mason, D.S.O., D.F.C., J. G. Matthew, J. D. Melrose, D.F.C., E. M. E. Michael, F. E. Morris, C. Murfitt, D. A. V. Nicolson, D.F.M., W. S. Northcott, D.F.C., D. J. G. Norton, W. P. O'Kane, D.F.M., R. Parsons, D.F.C., J. H. Pearce, H. K. Penfold, K. A. Perkin, R. F. B. Powell, R. R. Rawlins, P. Rowland, A.F.C., W. J. Runciman, A.F.C., D.F.M., R. S. Sanders, D.F.C., B. J. Scandrett, R. A. Schofield, A. R. Scott, D.F.C., E. N. Scott, A.F.M., H. J. Shield, D.F.C., D. Smith, F. N. Smith, D.F.C., H. S. Smith, J. C. Steele, C. T. Stimpson, D.F.C., G. J. Storey, A. K. Strudwick, D.F.C., C. A. Sullings, A. W. Tarry, W. A. Thynne, D.F.C., M.M., B.E.M., A. F. Wallace, D. A. Westcott, D. White, D.F.C., W. J. Wightwick, O G Williams, P. F. Wingate, D.F.C., F. S. Wood, J. C. Wright, A.F.C., J. H. W. Yeats, D.F.C.

Flying Officers: P. E. G. Bell, W. H. Cadamy, A. P. Clark, H. G. Clark, R. Colbeck, A. J. Colvin, N. O. Cornwall, B. R. A. Cox, J. A. Cunningham, J. C. Dargan, R. J. Davenport, A. F. Duffield, M. E. S. Evans, H. W. Guile, H. D. Hall, R. A. Hayward, D. Henderson, G. W. Hill, T. P. Hodgson, H. Jepson, F. S. W. Jolliffe, D. Jones, R. Knight, M. F. Laing, G. Meyrick, D. W. F. Muir, A. W. Paterson, I. M. Pedder R. S. Peters, S. A. Price, K. N. Rice, A. W. Ringer, G. P. Roberts, E. Rowley, B. H. L. Scott, E. R. A. Shelton, F. I. Smith, R. Thomson, J. D. Upton, R. R. Watson, P. J. Whittaker, M. G. E. Williams, I. T. Wilson, V. D. Woods, G. P. Young.

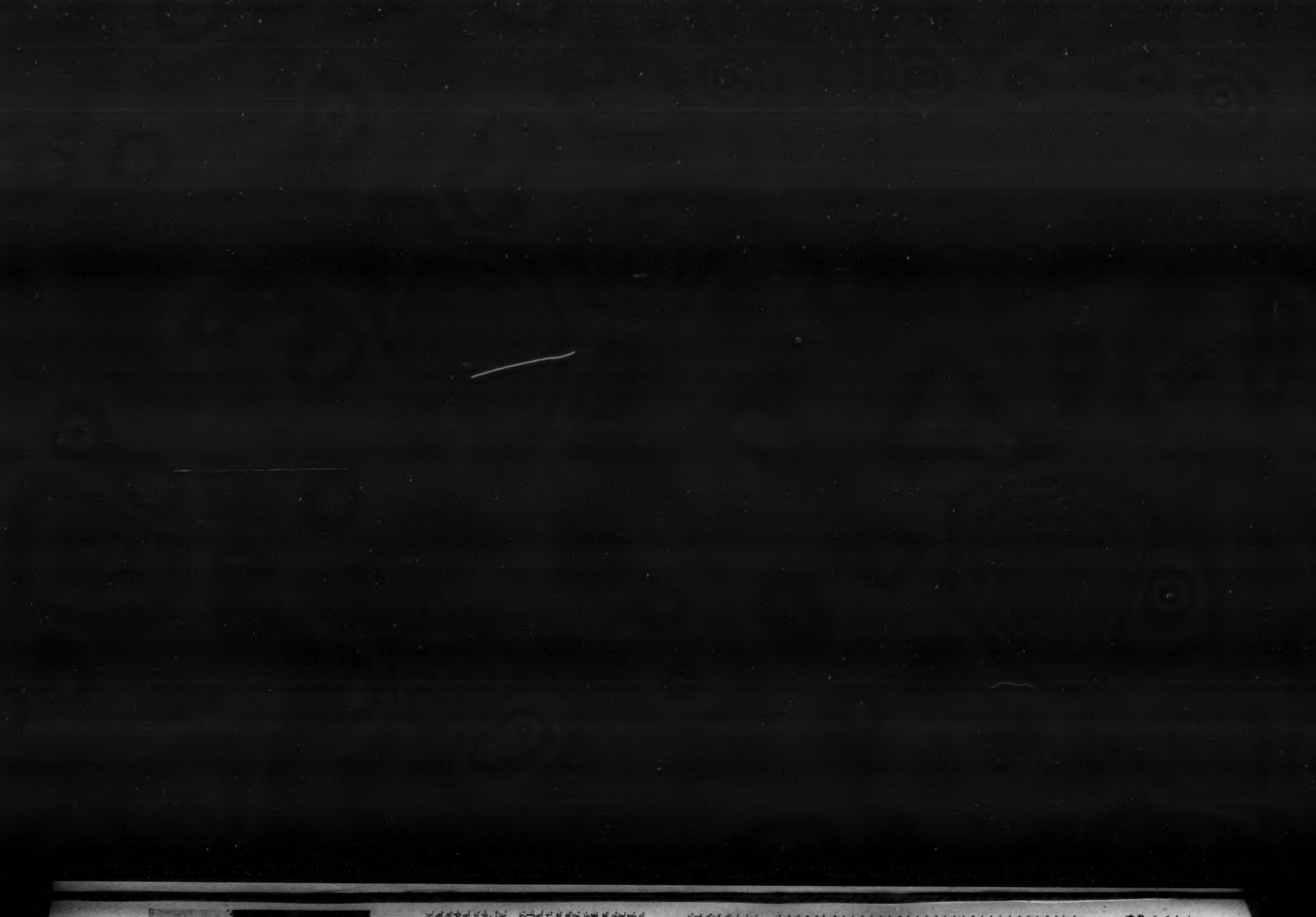
TECHNICAL BRANCH

Wing Commander: D. G. Viney, B.E.M.

Squadron Leaders: A. L. Baker, J. W. Berry, C. E. Fooks, C. J. Fox, M.B.E., W. G. H. H. Guiseley, H. J. R. Hailstone, E. A. Harrop, O.B.E., K. Hellawell, J. E. G. Hoile, T. C. Imrie, D.F.M., C. B. Jordan, H. N. Kitchen, C. G. Miles, T. C. Pratley, J. Ronnie, J. A. C. Scoular, A. G. Sollis, G. G. S. Taylor, J. A. Vigor, H. K. B. Wadham, E. C. C. White, P. C. Wright, M.B.E.

Flight Lieutenants: V. C. Arthur, G. J. Aylett, I. J. Badger, D.F.C., S. W. Bailey, A. Barnett, D.F.M., H. C. Bayliss, F. A. Black, C. J. Boalch, L. F. Bolding, M. G. Bourdaud'Hui, M. A. Boyd, G. A. Bristow, B. J. Brooks, D.F.M., E. Brown, G. N. Buckle, R. W. W. Buckley, J. P. Bullock, R. S. D. Burke, L. W. Capp, H. J. Card, N. C. Carey, E. J. Cashman, H. Clark, G. J. Clement, J. Cockshoot, S. M. Davidson, P. C. Dennis, C. L. Domoncy, J. W. C. Douglas, W. J. Dowd, F. C. Dummer, H. Durkin, H. C. R. Dyer, H. S. Ellis, W. J. Evans, C. A. Fieldhouse, H. Fincher, J. A. Fleming, C. W. Fletcher, D. J. Gallagher, J. Gibbon, B. Goodale, D.F.C., S. Graham, R. G. E. Griffiths, H. J. J. Gurd, V. S. Hall, V. M. Hammond, A. W. Hannaford, D. L. Hart, N. R. G. Hartwell, E. Heathcote, R. Hill, H. W. C. Hodges, R. Howes, W. A. James, C. W. Jefford, J. A. Jones, M. D. Logan, R. S. Loveland, R. W. Lowden, J. A. M. MacBean, M.B.E., N. W. Maskell, G. C. Matthews E. H. Maule, A. May, J. D. Morgan, R. M. Morton, H. J. Parker, D.F.M., L. L. Parker, O. B. Parker, D. Pearson-Kirk, A. F. Plant, D.F.M., H. A. Pook, H. F. Powell, K. J. Reeder, G. Ryder, A. R. R. Scourfield, D. E. Sharpe. A. H. Sheppard, J. L. Sharrard, B.E.M., G. T. Smyth, G. W. Sparks, J. H. Spencer, T. A. J. Stocker, S. G. Tatem, T. Taylor, S. Tipper, J. Tocher, J. E. Tompkins, G. Tumbling, C. F. L. Turner, B.E.M., W. T. Wakeham, M.B.E., W. B. Wells, A. D. Weir, J. B. Wellington, J. Whelan, A.F.C., W. A. Wildman, W. J. Willetts. W. F. G. Withers.

ROCKET ASSISTANCE : Rearming a Malayan Task Force Beaufighter with R.P.s. "Beaus" are no newcomers to jungle warfare, and have given invaluble aid to ground forces in day and night operations.

Reunion

NO. 669 Squadron and Nos. 23, 24 and 37 Glider Servicing Echelons are holding their Reunion at The Holyrood, Wells St., W.1, on Saturday, Nov. 6th, at 7 p.m. All ranks are asked to contact P. O'Brien, 4, Walton House, Longford St., N.W.1.